USER SERVICE REQUIREMENTS

SOFTWARE SUPPORT

INPUT

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OCTOBER 1987

USER SERVICE REQUIREMENTS

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1280 Villa Street, Mountain View, California 94041-1194 (415) 961-3300

Published by
INPUT
1280 Villa Street
Mountain View, CA 94041-1194
U.S.A.

Customer Service Program (CSP)

***User Service Requirements–
Software Support***

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FUSW • 164 • 1987

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Abstract

This report, *User Service Requirements-Software Support,* examines the support delivery and performance requirements of users of systems and applications software from the following vendors: ADR, Cullinet, DEC, IBM, McCormack & Dodge, MSA, NCA, Pansophic, Sterling, and UCCEL. The sample of over 300 users is broken down and analyzed on a vendor-by-vendor basis.

The report begins by examining contractual and ad hoc software support delivery from each vendor. Each product is analyzed regarding its freedom from major and minor software problems as well as the vendor's ability to quickly resolve each problem. Next, each vendor's ability to measure and then satisfy its own users' needs for specific software support services, such as telephone support, documentation, and training, is studied. Lastly, each product's user sample's willingness to consider alternative (third-party) support sources is measured.

In addition, an analysis of the entire sample's attitudes about and satisfaction with the software support received is presented as a source of comparison, not only for each individual vendor performance analysis, but also for last year's software support user analysis as well.

This report consists of 112 pages, including 83 exhibits.

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TITLE
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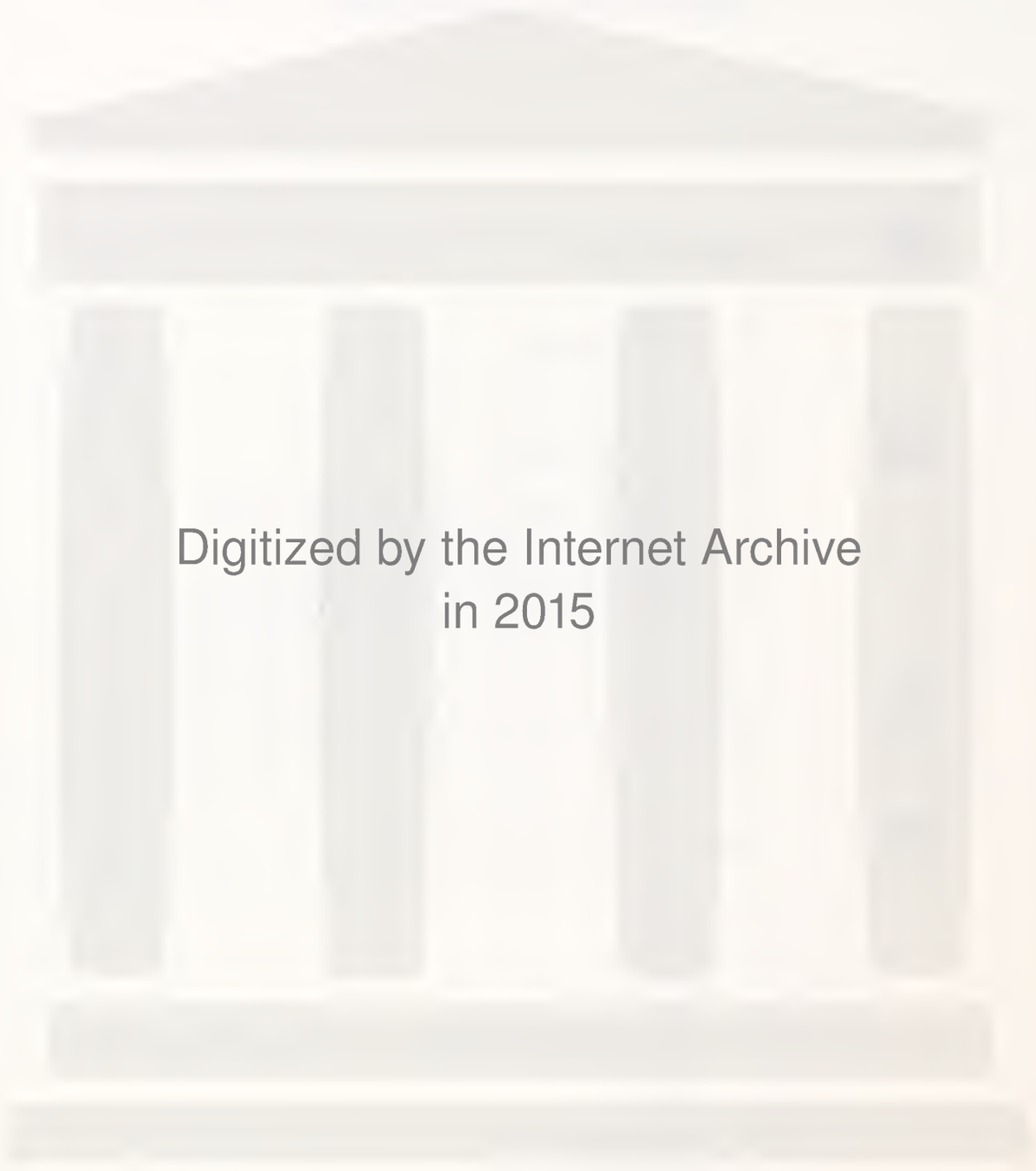
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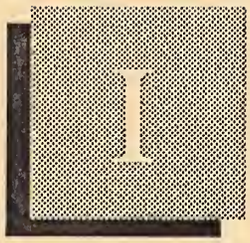
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Introduction

I Introduction

A Scope

The importance of software support in the overall data processing operations of users is growing at an extremely fast rate as the hardware components of systems become more reliable and as applications performed become more sophisticated. Software problems constituted 30% of all large system interruptions and 20% of all small system interruptions in INPUT's 1987 User Service Requirement research, and INPUT expects that these percentages will grow in 1988.

This report, *User Service Requirements-Software Support,* is the first deliverable in a series of reports that INPUT is preparing on software support. The report analyzes software support needs of users of ten vendors' software packages. Rather than simply reporting user satisfaction with the support that they receive from their vendor, this report attempts to define what levels of support each vendors' own user sample requires as well as how effectively each vendor is meeting those requirements. In this way, the report highlights areas of opportunity for each vendor, in terms of both support improvement and new support revenue sources.

B Methodology

The basis for this report was the analysis of telephone interviews with 302 software users, broken down by product used in Exhibit I-1. This sample represented an increase in size of almost 40% over 1986. Exhibit II-2 breaks down the user sample by industry served.

Each user was interviewed using the questionnaire located in Appendix A at the end of this report. Respondent titles typically were data processing manager, operations manager, or software (applications) manager. Each interview lasted approximately twenty minutes.

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EXHIBIT I-1

SAMPLE BY VENDOR

SOFTWARE VENDOR	INTERVIEWS
ADR	30
Cullinet	30
DEC	31
IBM	30
McCormack & Dodge	30
MSA	30
NCA	30
Pansophic	30
Sterling	31
UCCEL	30
Total	302

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EXHIBIT I-2

SAMPLE BREAKDOWN BY INDUSTRY SERVED

INDUSTRY SERVED	NUMBER OF RESPONDENTS
Manufacturing	128
Banking & Finance	28
Services	24
Distribution	23
Insurance	20
Government	19
Medical	17
Utilities	13
Education	12
Transportation	7
Telecommunications	6
Others	5
Total	302

All interviews were then entered into a dBASE III data base and prepared for statistical analysis using ABSTAT (a popular statistical package).

A list of definitions of terms used in this report is located in Appendix B at the end of the report.

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Executive Summary

II

Executive Summary

This Executive Summary is provided as a convenient overview of the main points of this report. It is presented in a format that facilitates the use of this section as a short presentation, with each exhibit accompanied by text that acts as a script detailing the key findings of the study.

This is the second year that INPUT has analyzed the support requirements and experiences of users of applications and systems software (other than the operating system, which is covered in the User Service Requirements reports for large and small systems). Last year, the sample indicated that support performance received by the user sample met the needs of the users in all areas except for documentation.

In 1987, users also reported dissatisfaction with the documentation. However, user satisfaction with training and consulting dropped considerably in 1987, suggesting that user requirements for these services are increasing at a faster rate than vendors are able to provide.

On the other hand, user satisfaction with the phone support that they received increased, indicating a realization of the cost effectiveness of this delivery mode of software support.

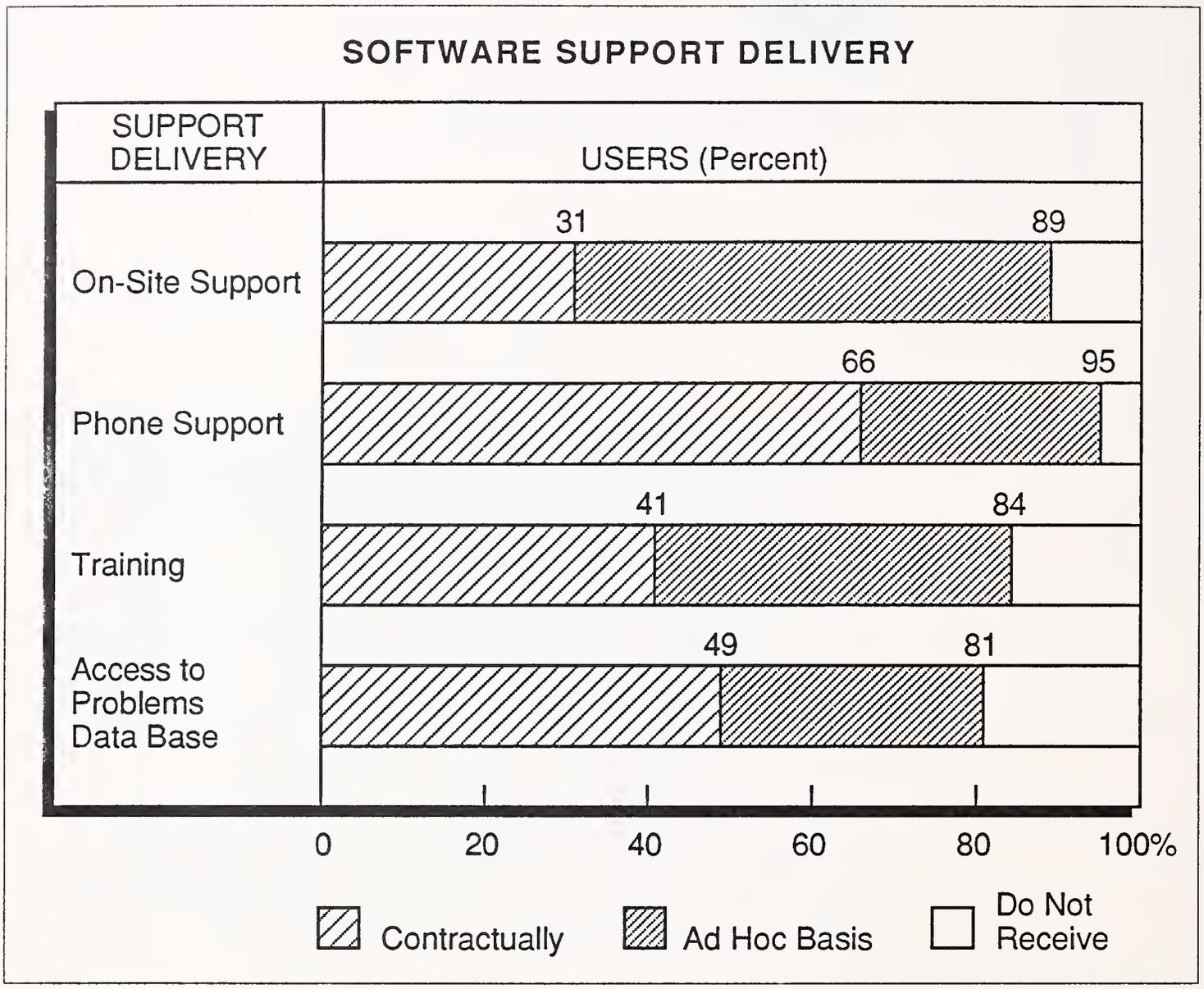
A

Software Support Delivery Methodology

Software support delivery differs from hardware maintenance in that software users expect (and receive) their support predominantly via the telephone rather than on-site. Exhibit II-1 shows that 66% of the software support sample received phone support contractually, versus 31% who contracted for on-site support. This reliance on phone support, typically in the form of "hotline" service, provides the user with fast response to questions or problems without the additional burden of on-

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EXHIBIT II-1



site support costs. The vendor benefits from not having to incur the steady costs of sending software engineers to support a dispersed product base.

Interestingly, almost nine out of ten of the sample had some experience with on-site support (on an ad hoc basis). Most likely, these users paid hourly (programming) fees to receive this support, although in some cases these on-site visits may have been scheduled "good will" visits performed at no charge.

Phone support can be an extremely effective support offering if offered in conjunction with access to a problems data base. However, less than half

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of the software users surveyed contractually received this support service. On a positive note, this usage is up significantly from last year's response, which saw only 28% of the respondents contracting for this.

Most discouraging is the continued lack of contracted support in the area of education and training. A majority of all software interruptions can be attributed to user misuse or abuse of their package. Most often, this can be connected to insufficient training and incomplete (or incomprehensible) documentation. Software support vendors could improve user satisfaction while at the same time reduce support costs by emphasizing training.

B

Software Support Performance

Exhibit II-2 acts to reinforce the findings previously presented in this study:

- First, that phone support is viewed by software users as the most important form of support that they receive directly from their vendors, and, for the most part, vendor performance currently satisfies user requirements.

- Second, that software documentation does not even come close to satisfying the needs of users.

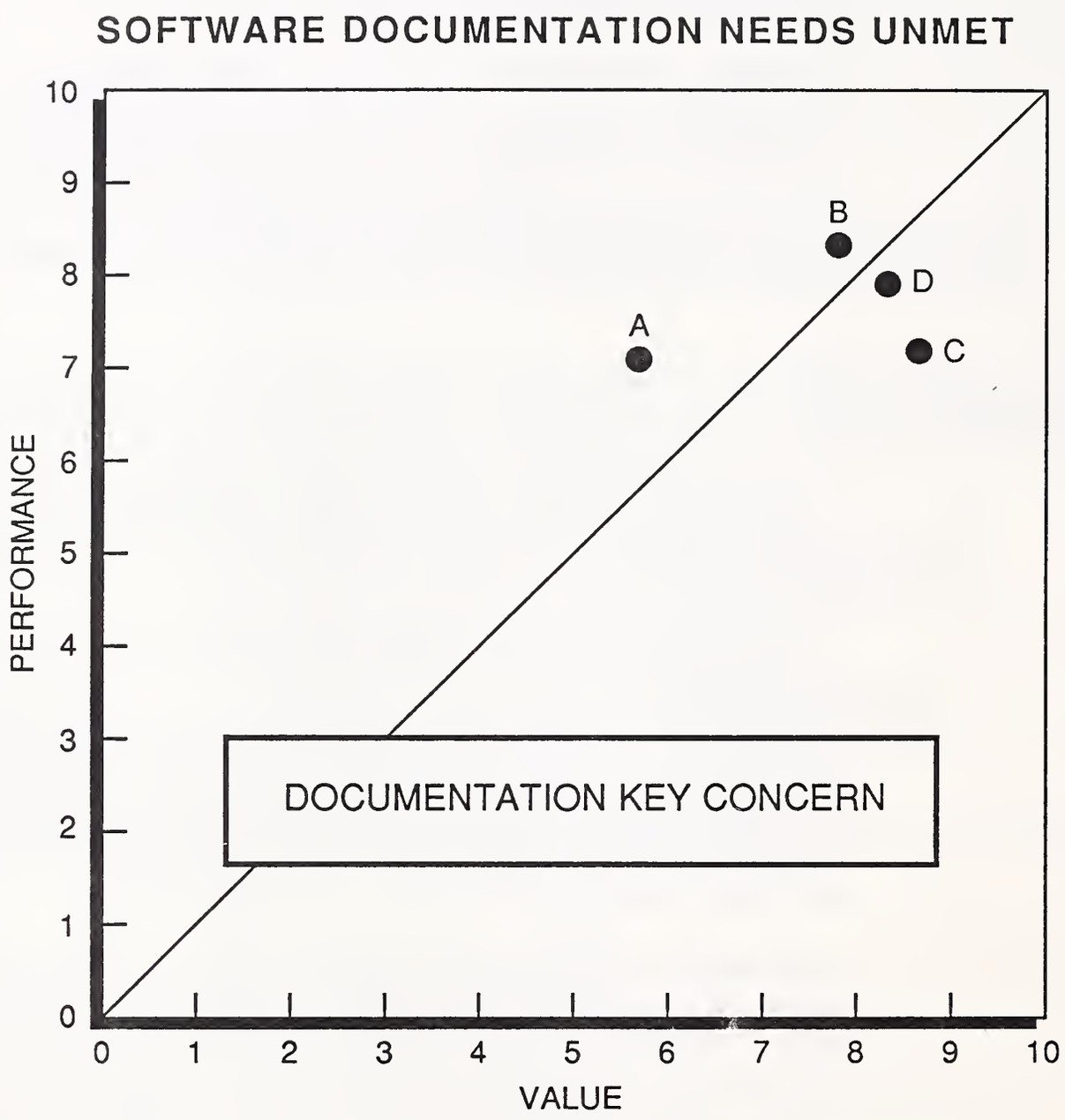
Users have assumed much responsibility for the operations and support of their applications software. Because of this, users place a premium on clearly presented documentation. Unfortunately, current documentation often is poorly written and presented. This shortcoming is exacerbated by declining experience levels common at user organizations.

This dissatisfaction with the documentation acts to lessen user satisfaction with other components of the support and usage of the software product. For example, users' satisfaction with the engineer with whom they have to deal as a result of not understanding the documentation, places a strain on the user-engineer relationship, particularly if the solution offered by the support specialists is to "look it up in the documentation."

The value that users place upon these services is increasing steadily as users' expectations for 100% system availability increases and advances in hardware reliability place the focus of attention on the software components.

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EXHIBIT II-2



A = On-Site Support

B = Phone Support

C = Documentation

D = Software Engineer Skill Level

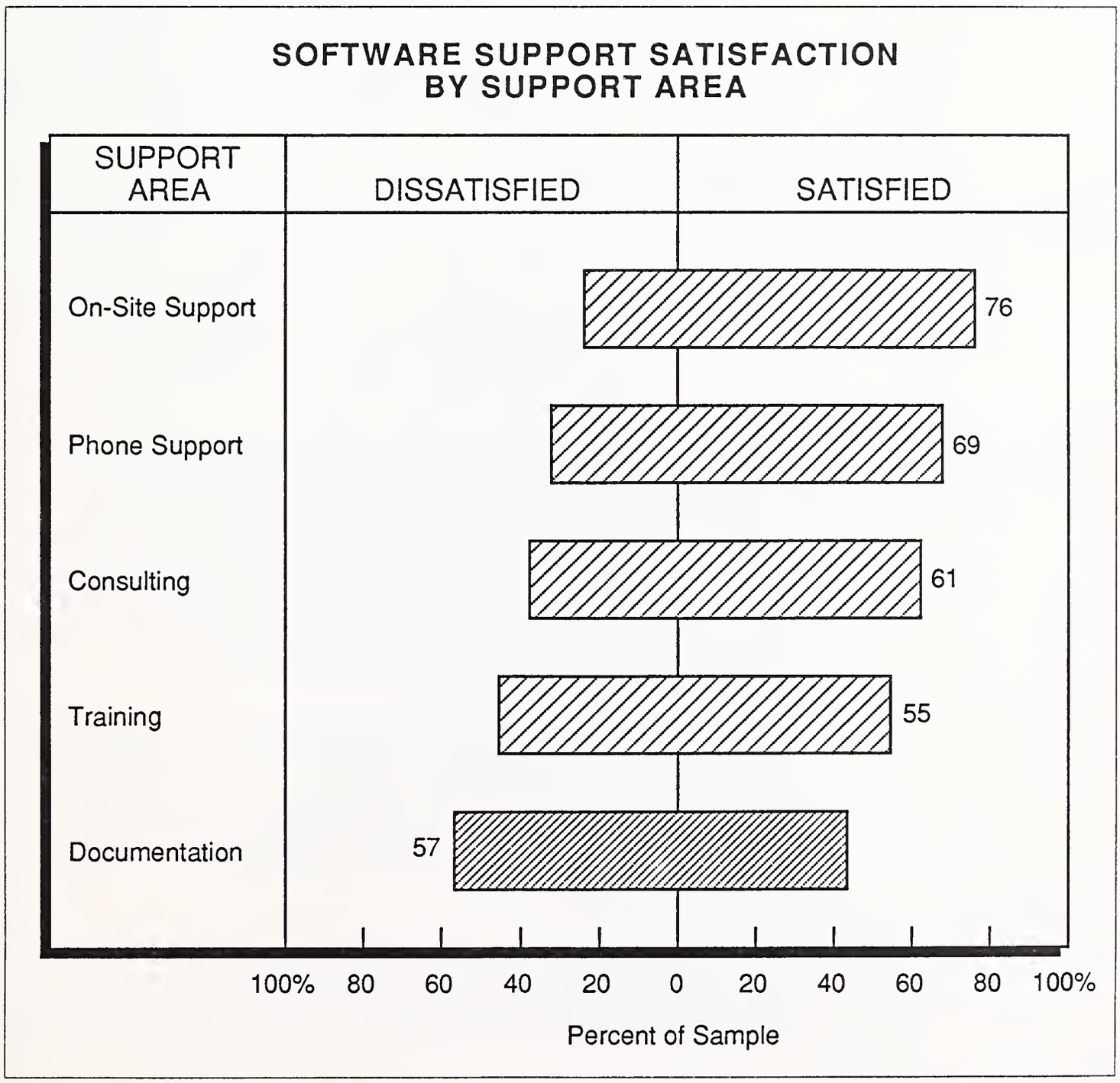
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C

Documentation Key Support Deficiency

The extent of user dissatisfaction with documentation is illustrated in Exhibit II-3, which shows that 57% of the users surveyed in 1987 were dissatisfied with their documentation. This reflects a decline in satisfaction from 1986, when 54% of the sample reported that they were dissatisfied with their documentation.

EXHIBIT II-3



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When asked what single change or improvement the users would like to see, documentation was far and away the number one choice, specified by 47 out of the 302 users (or 16% of the sample) surveyed. No other support or performance feature was mentioned more than ten times.

Most often, users complained about the lack of clarity of the documentation or the "user friendliness" of the manuals. The users requested better indexing and more comprehensive trouble-shooting guides.

In general, it appears that documentation rarely is written with the audience in mind. Often, documentation is written by the product design team, who frequently make assumptions about the end user's level of expertise that are not valid. Lastly, the lack of effective end-user training further highlights the deficiencies of software documentation.

D

Third-Party Software Support Opportunities

As hardware maintenance price reductions decrease future hardware maintenance revenue opportunities, third-party maintenance (TPM) organizations are being forced to consider alternative sources of revenues. Many TPMs have identified the telecommunications product marketplace as one possible "replacement," but a shortage in skilled technicians and expertise has acted to limit growth in this market.

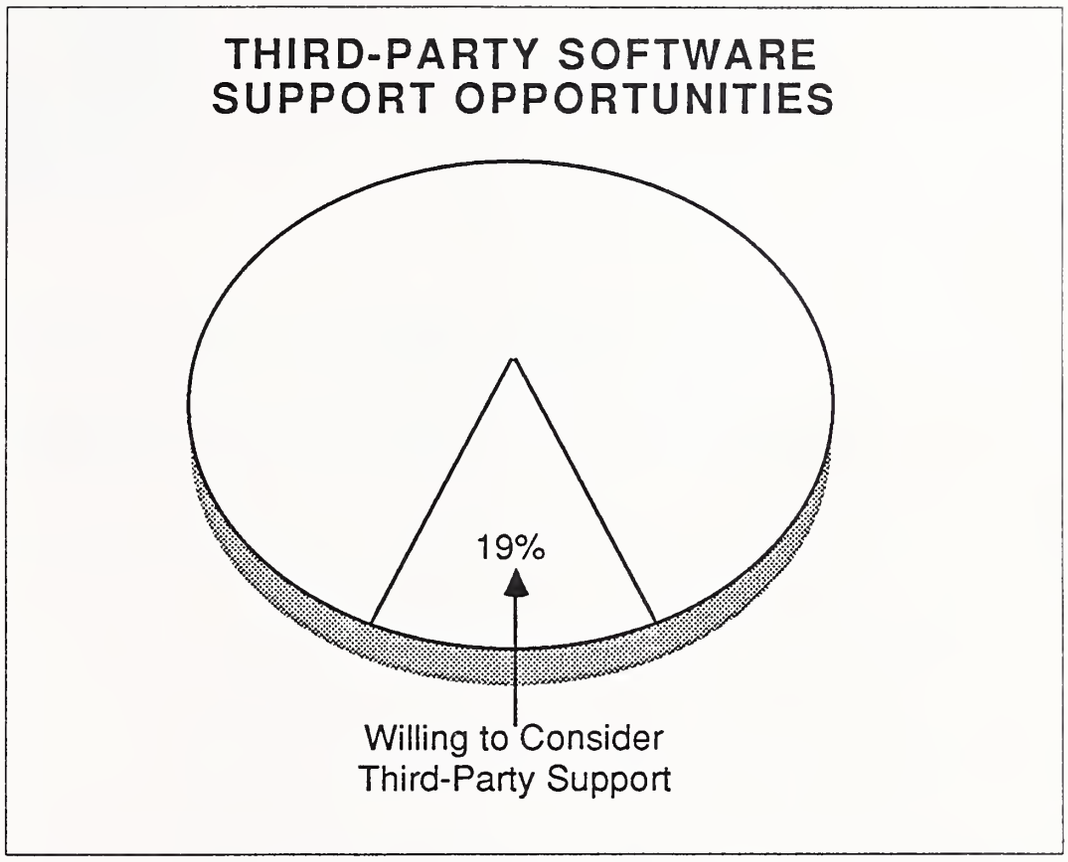
Instead, some TPMs have looked to increasing their involvement in software support as a new strategic direction. One leading vendor, Control Data Corporation, has drawn from its experience as both an equipment vendor and a major user by offering third-party support for both DEC and IBM software. While most other TPMs have cautiously taken a wait-and-see attitude (one TPM official said that they "let CDC be the pioneer that catches all the arrows"), most major TPMs are at least examining the software support market for future entry.

Exhibit II-4 suggests that software users currently show limited enthusiasm for third-party software support, with only 19% of the sample willing to consider such an alternative. This finding is also supported by earlier research performed by INPUT which found that only 24% of current TPM users would be willing to have their TPM support their applications software.

These findings are more a reflection of user perception that TPMs do not have the expertise to provide such support. GE, a leader in the TPM market, was recently quoted to the effect that TPMs do not have the same

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EXHIBIT II-4



level of expertise as the software vendors. However, TRW, Sorbus (through its parent Bell Atlantic), CDC, GE, and Intelogic Trace all have had some contact with software as a supplier and, as a result, should draw upon and market this experience in order to exploit this market.

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Software User Service Requirements: All Users

III

Software User Service Requirements: All Users

In 1987, INPUT surveyed 302 users of non-operating systems and applications products from ten vendors: ADR, Cullinet, DEC, IBM, McCormick & Dodge, MSA, NCA, Pansophic, Sterling, and UCCEL. This sample size represented an increase of almost 40% over 1986, when 216 users were interviewed. All interviews were conducted by telephone, and each interview lasted approximately twenty minutes in length.

On the average, the software support users reported that they paid 13.4% of the package's license for software support, up from last year's average of 12.3%. As opposed to hardware maintenance respondents, very few software users mentioned support prices as a problem they felt needed attention, giving credence to INPUT's recommendation that vendors should consider price increases in order to support quality.

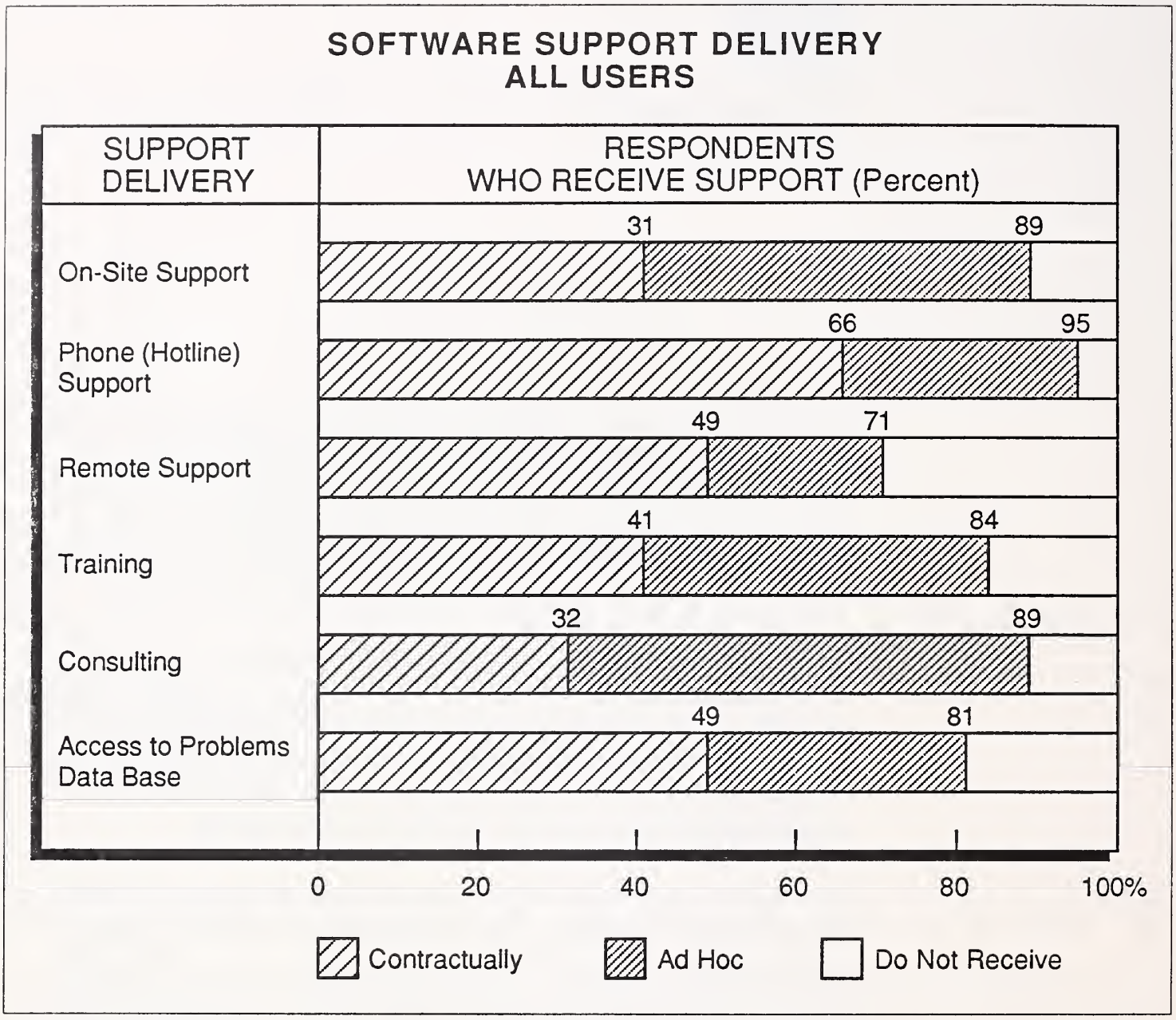
Exhibit III-1 analyzes the software support delivery modes experienced by the software user sample. Much like last year, the 1987 sample reported greatest experience with telephone support as their contractual support offering, with 66% of the sample contracting for this offering versus only 31% who contract for on-site support. Users often opt for phone support due to its responsiveness and lower cost. When used in conjunction with problems data bases, phone support can often provide prompt resolution to most circumventable problems.

Interestingly, almost nine out of ten users had some experience with on-site support on an ad hoc basis, presumably paying on a hourly basis for such support, although a few may have received limited on-site support at the time of installation.

Encouraging is the growth in experience with remote support, contracted by almost 50% of the 1987 sample versus 39% of last year's user base.

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EXHIBIT III-1



Such usage indicates that both users and vendors are benefitting from the improved support and reduced costs inherent in the remote down-line loading of software fixes.

Less encouraging is the lack of contractually-supplied training and consulting support. Less than two-thirds of the users reported that they received satisfactory levels of support in each of these areas, suggesting that vendors could do well to improve the performance aspects of their support offering by stressing the importance of these service areas to their users.

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Exhibit III-2 reports on the number of major and minor problems encountered by the sample as well as the turnaround time required to resolve those problems. Major problems are defined as those that prevent further processing, while minor problems allow continued processing with some degradation.

EXHIBIT III-2

SOFTWARE SUPPORT PERFORMANCE
ALL USERS

SUPPORT COMPONENT	
Number of Major Problems Reported per Month	0.4
Number of Major Problems Resolved per Month	0.4
Turnaround Time of Major Problems (Hours)	20.6
Number of Minor Problems Reported per Month	1.5
Number of Minor Problems Resolved per Month	1.5
Turnaround Time of Minor Problems (Hours)	26.5

In 1987, users experienced less than one major problem per every two months, which is down slightly from last year's results. Turnaround time on those problems was much improved in 1987, averaging 20 hours versus 65 hours in 1986. Increased usage of remote support and reduced reliance on mailed fixes accounted for much of this improvement.

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The users encountered fewer minor problems in 1987, 1.5 per month versus 2.6 in 1986. Turnaround time was reduced from an obscenely high 200 hours in 1986 to a much more responsive 26 hours in 1987. Users were partly to credit in this reduction since many users improved their problem tracking and documentation procedures. Moreover, software vendors began addressing minor problems in a much more responsive manner instead of relying on scheduled mailed revisions to handle minor software "bugs."

As a result, user satisfaction with both major and minor problem resolution was quite high in 1987, as shown in Exhibit III-3. In 1986, users rated major problem resolution an 8.2 and major problem turnaround time an 8.0, versus 8.8 and 8.7 in 1987, respectively. Users were even more pleased with minor problem resolution and turnaround time, rating both resolution and turnaround an 8.2 in 1987 (versus 7.9s in 1986). Not surprisingly, overall satisfaction with support was also rated higher, 8.2 in 1987 versus 7.9 in 1986.

Exhibits III-4 through III-6 examine software support performance and user satisfaction in greater detail. In Exhibit III-4, users rate the value placed on each software support category, at the same time rating the performance received in each area. Users rated documentation as their most important support requirement, followed by software engineer skill level and phone support.

Since documentation is so vital to the end user, it is distressing that documentation performance was so poorly received. Exhibit III-5 shows that only 43% of the users were satisfied by their documentation, down slightly from 1986 when 46% were satisfied. Documentation clarity and usability was most often cited as the single most important improvement desired by this sample.

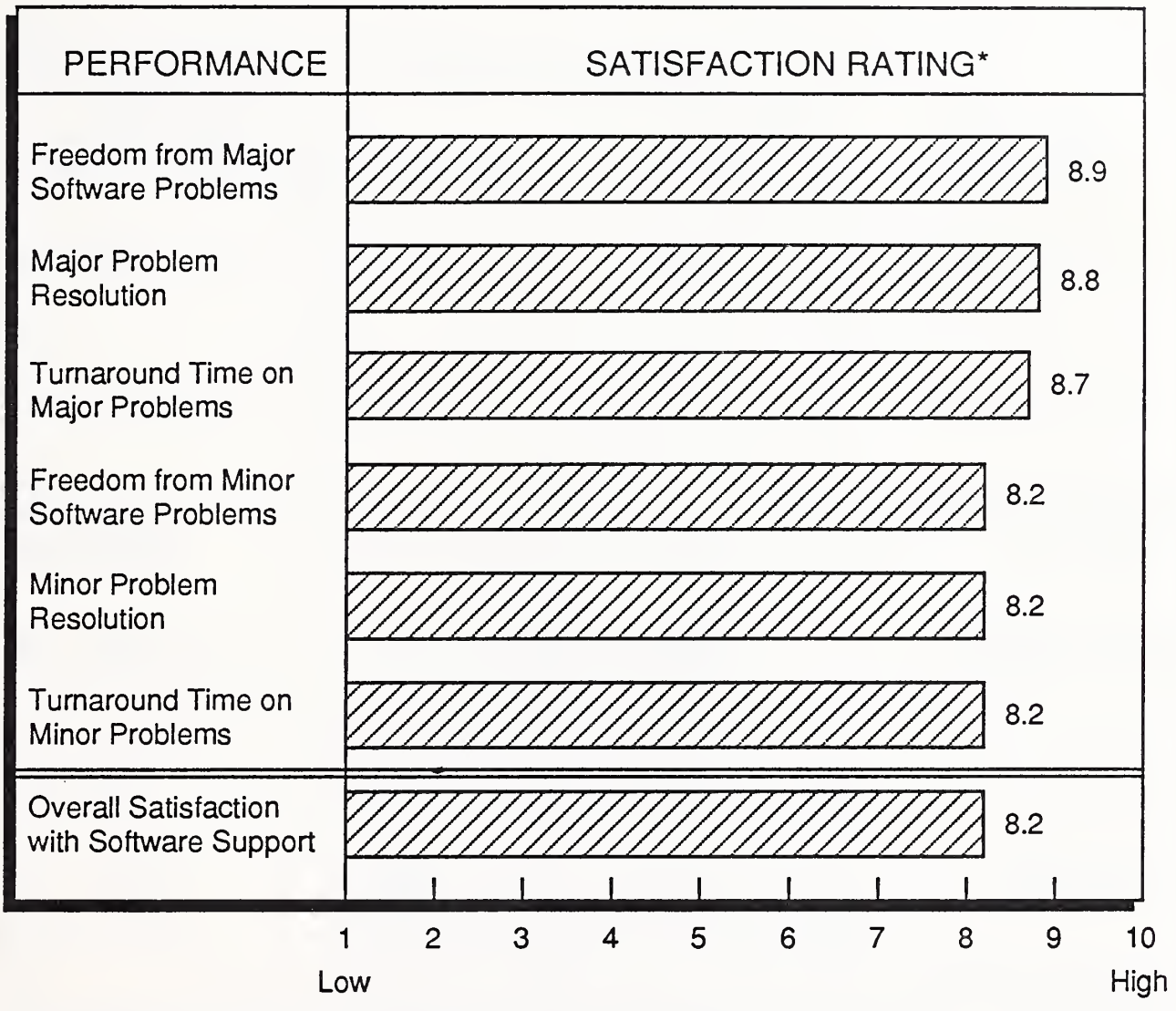
Another area of concern is training, especially in light of user dissatisfaction with documentation. Vendors need to stress the need for contracted training on an ongoing basis.

Users also expressed some level of dissatisfaction with the skill level demonstrated by the software support engineer skill level. In part, this dissatisfaction may be directed at the actual expertise of the engineer in question. More likely, the users were dissatisfied with the "people skills" of the support person and their ability to communicate with this person. In any case, improvements in both end-user training and documentation will act to improve user satisfaction with the support personnel.

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EXHIBIT III-3

USER SATISFACTION WITH SOFTWARE SUPPORT PERFORMANCE ALL USERS



*Average Standard Error of the Mean: 0.1

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EXHIBIT III-4

SOFTWARE SUPPORT VALUE/PERFORMANCE LEVELS ALL USERS

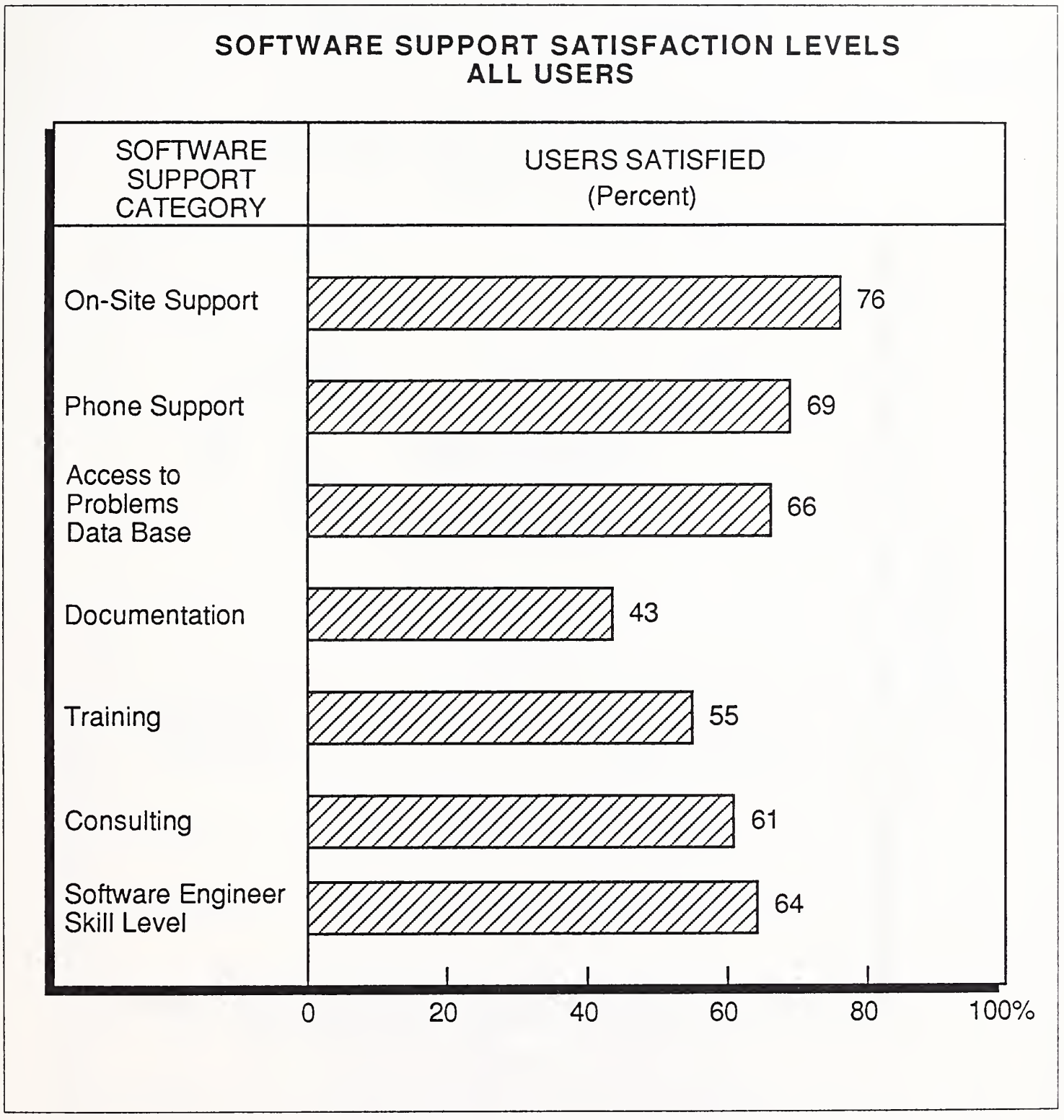
SOFTWARE SUPPORT CATEGORY	LEVEL OF SUPPORT		PERFORMANCE EXCEEDS (FALLS BELOW) USER VALUE
	VALUE	PERFORMANCE	
On-Site Support	5.7	7.1	1.4
Phone Support	7.8	8.3	0.5
Access to Problems Data Base	7.4	7.1	(0.3)
Documentation	8.7	7.2	(1.5)
Training	7.5	6.7	(0.8)
Consulting	7.2	6.9	(0.3)
Software Engineer Skill Level	8.3	7.9	(0.4)

Scale: 1 = Low, 10 = High

Average Standard Error of the Mean: 0.2

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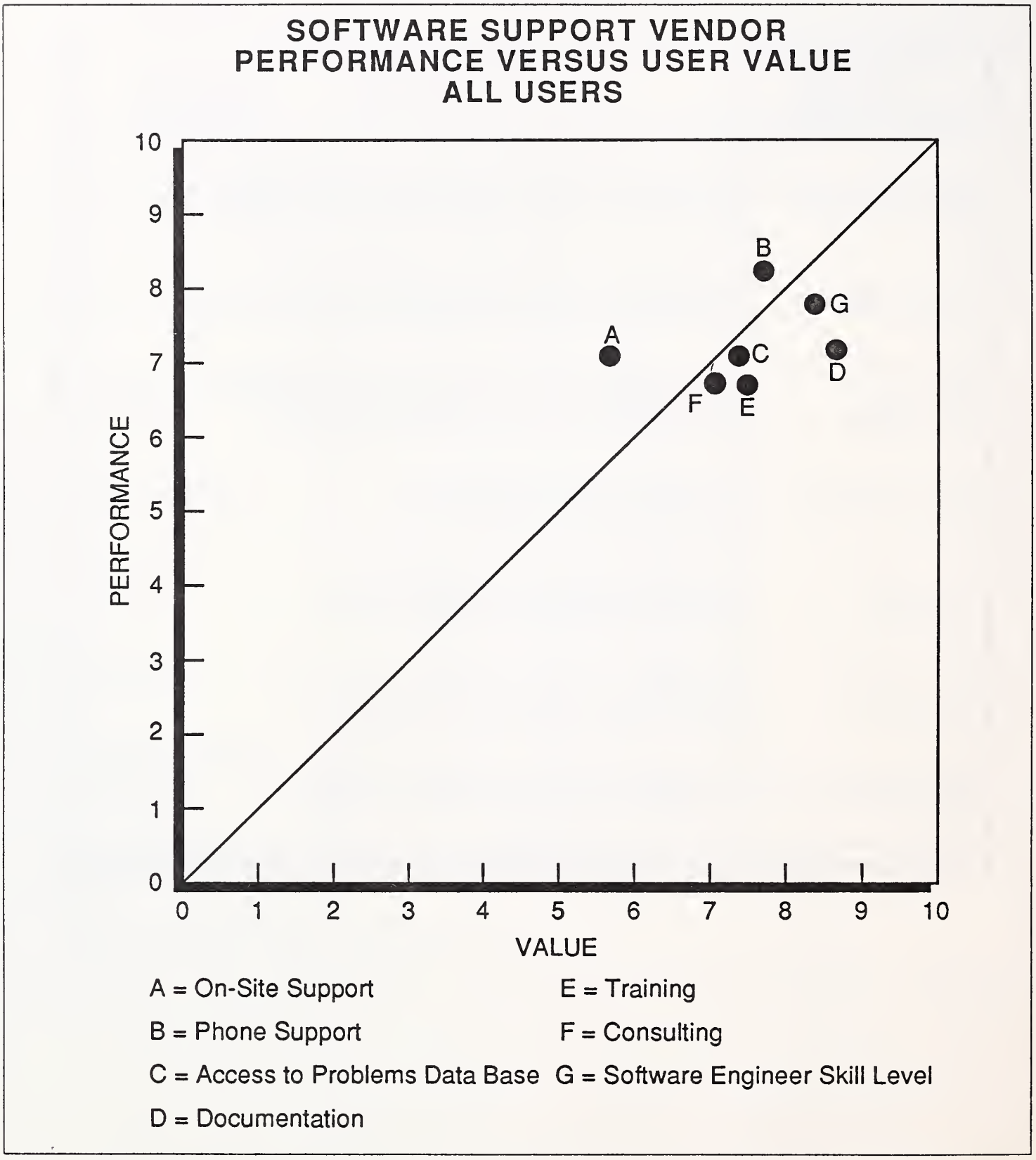
EXHIBIT III-5



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Exhibit III-6 graphically plots software support performance versus the value that users place on each service. Again, the largest gap in support performance falls in the areas of documentation and training.

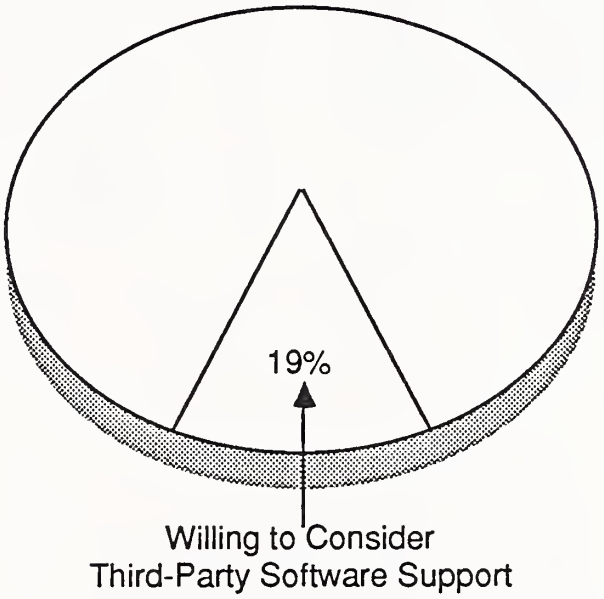
EXHIBIT III-6

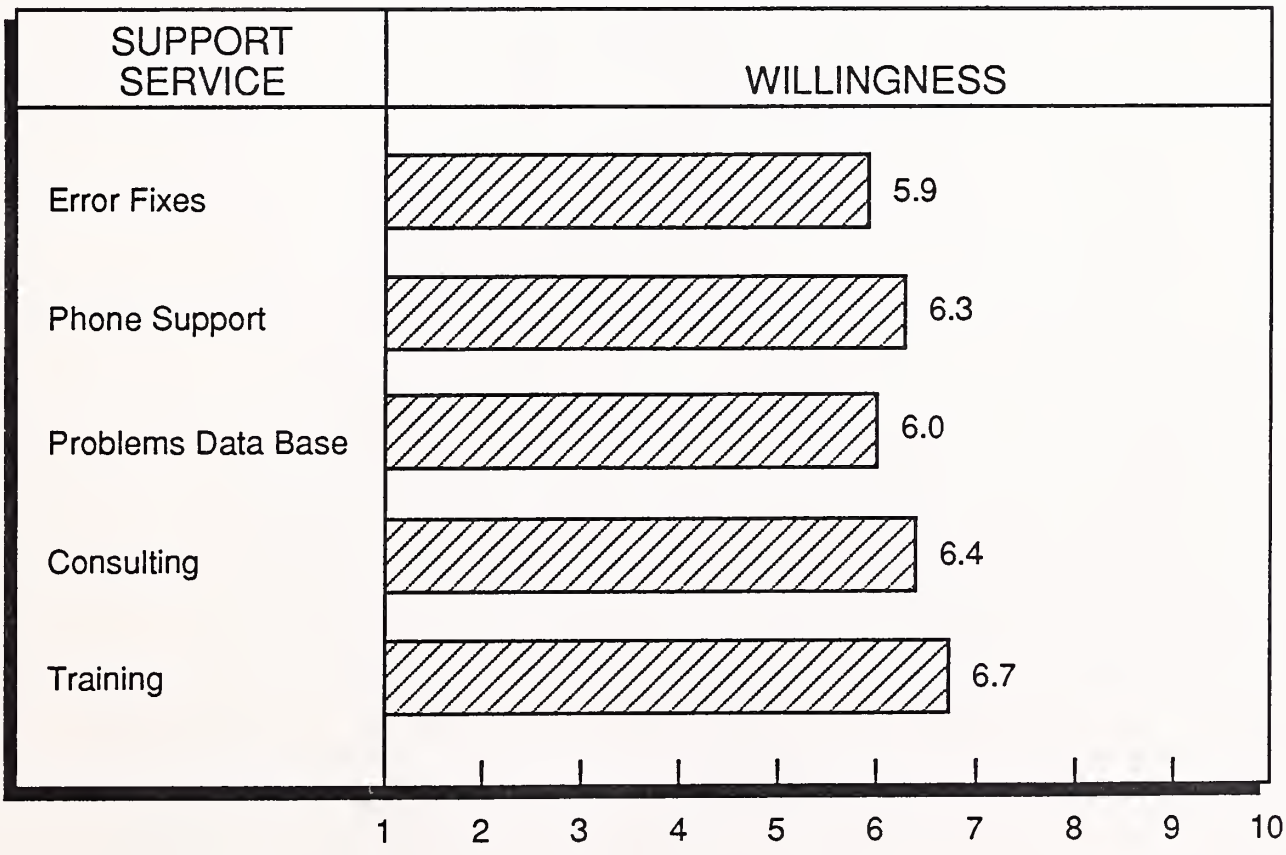


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EXHIBIT III-7

WILLINGNESS TO CONSIDER THIRD-PARTY SOFTWARE SUPPORT ALL USERS





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Exhibit III-7 measures software user willingness to consider third-party software support as an alternative to their current software vendor. Only 19% of the software support user sample indicated a willingness to try third-party software support, as much a reflection of their doubts that such support is actually available as a reflection of satisfaction with their current support. Indeed, users report greatest interest in third-party training and consulting, two areas where current software support performance is weakest.

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Vendor Performance Analyses

IV

Vendor Performance Analyses

In the following chapter, INPUT will analyze software vendors' performances in meeting the software support requirements of their own users on a vendor-by-vendor basis. Each analysis will begin with a description of how support is delivered to users. Next, each vendor's ability to deliver problem-free, or at least problem-resistant, software to its users, as well as its responsiveness and effectiveness in resolving the problem is examined, followed by an analysis of each vendor's performance in meeting the requirements that users have for specific support needs, such as documentation, training, and phone support. Lastly, each vendor's user sample's attitudes towards third-party support alternatives are analyzed.

A

ADR

INPUT surveyed thirty users of ADR software in 1987. The sample can be broken down further as follows: Seventeen users of Librarian (a source program management system), ten users of Datacom/DB (a data base/file management system), and one user each of Empire (a decision support system), Look (a performance measurement system), and Vollie (a programming utility package).

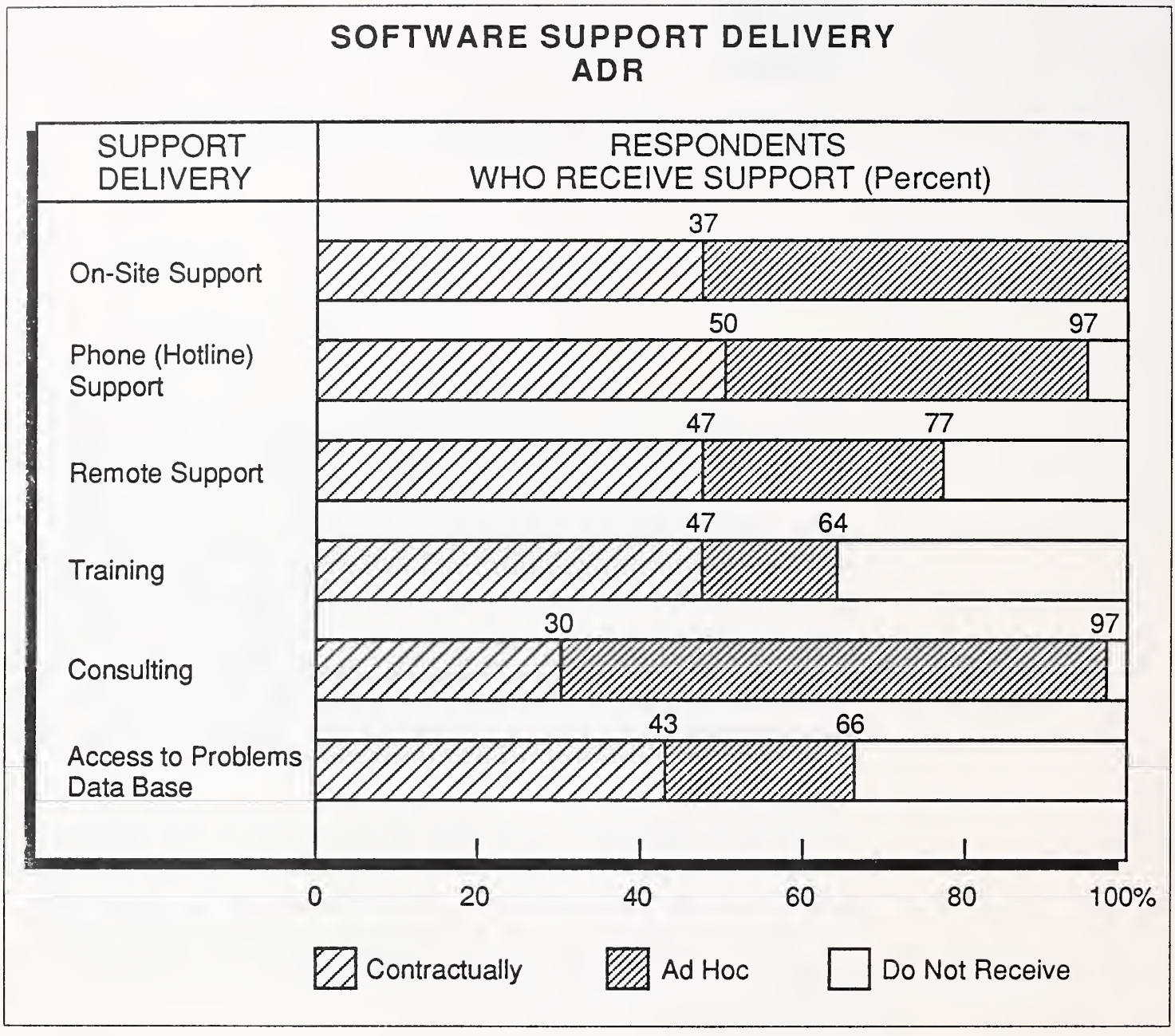
These packages run on IBM 370 architecture and the sample hardware breakdown reflects this: Thirteen IBM 30XXs, fifteen IBM 43XXs, and one NAS AS/8XXX.

Most of the software programs fall in the $20,000-30,000 range, with the exception of Datacom/DB, which runs between $89,000-116,000. On the average, users paid 14.8% of the license fee for annual software support.

Exhibit IV-1 presents a picture of how users typically receive their support from ADR. While all ADR users receive some level of on-site

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EXHIBIT IV-1



support, only 37% reported that they receive on-site support contractually. Half of the users opt for telephone support contracts, usually in conjunction with access to a problems data base and remote support.

ADR offers initial training free of charge to users; after that, users must pay for additional training on a per person, per day charge that runs between $300-1000 for three- to five-day courses. Half of the users contract for training; however, over one-third of the users reported that they receive no additional training.

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One reason that so few ADR users contract for support beyond the first year of free coverage may be the reliability of the packages, shown in Exhibit IV-2. ADR users reported so few major problems that it was impossible to present a valid problem resolution turnaround time. ADR software was also relatively free from minor problems, averaging just over one per month. Problem resolution occurred in less than one day, reflecting the effectiveness of telephone and remote support activities at ADR.

EXHIBIT IV-2

SOFTWARE SUPPORT PERFORMANCE
ADR

SUPPORT COMPONENT	
Number of Major Problems Reported per Month	0.1
Number of Major Problems Resolved per Month	0.1
Turnaround Time of Major Problems (Hours)	*
Number of Minor Problems Reported per Month	1.1
Number of Minor Problems Resolved per Month	1.1
Turnaround Time of Minor Problems (Hours)	6.1

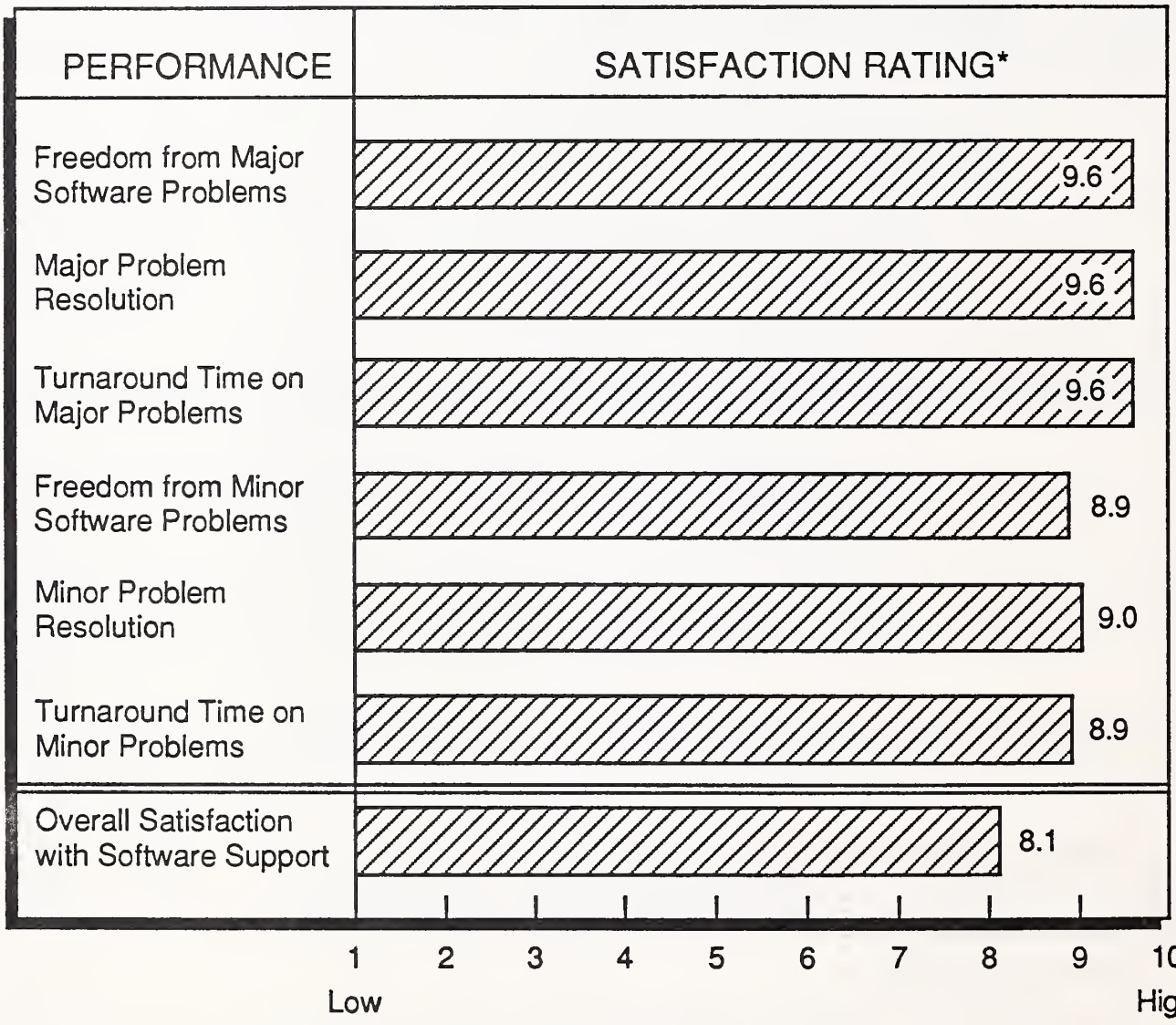
*Insufficient Response

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Thus, it is not surprising that ADR users rated their software's freedom from problems and their support vendors' responsiveness and effectiveness extremely high in Exhibit IV-3. The ADR sample rated their overall satisfaction with support lowest (8.1 out of 10), suggesting that while ADR software is problem-free, perhaps the support delivery may have a few problems.

EXHIBIT IV-3

USER SATISFACTION WITH SOFTWARE SUPPORT PERFORMANCE ADR



*Average Standard Error of the Mean: 0.2

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Exhibits IV-4 through IV-6 present a more detailed analysis of ADR user satisfaction with ADR service performance. Exhibit IV-4 indicates that ADR users place the highest priority on documentation, phone support, and access to problems data bases. ADR performance, as rated by the ADR sample, does not meet the mean value in the areas of documentation and problems data bases.

EXHIBIT IV-4

SOFTWARE SUPPORT VALUE/PERFORMANCE LEVELS ADR

SOFTWARE SUPPORT CATEGORY	LEVEL OF SUPPORT		PERFORMANCE EXCEEDS (FALLS BELOW) USER VALUE
	VALUE	PERFORMANCE	
On-Site Support	6.7	8.5	1.8
Phone Support	8.7	8.9	0.2
Access to Problems Data Base	8.4	7.4	(1.0)
Documentation	9.2	6.7	(2.5)
Training	7.8	8.0	0.2
Consulting	7.1	7.5	0.4
Software Engineer Skill Level	6.1	8.1	2.0

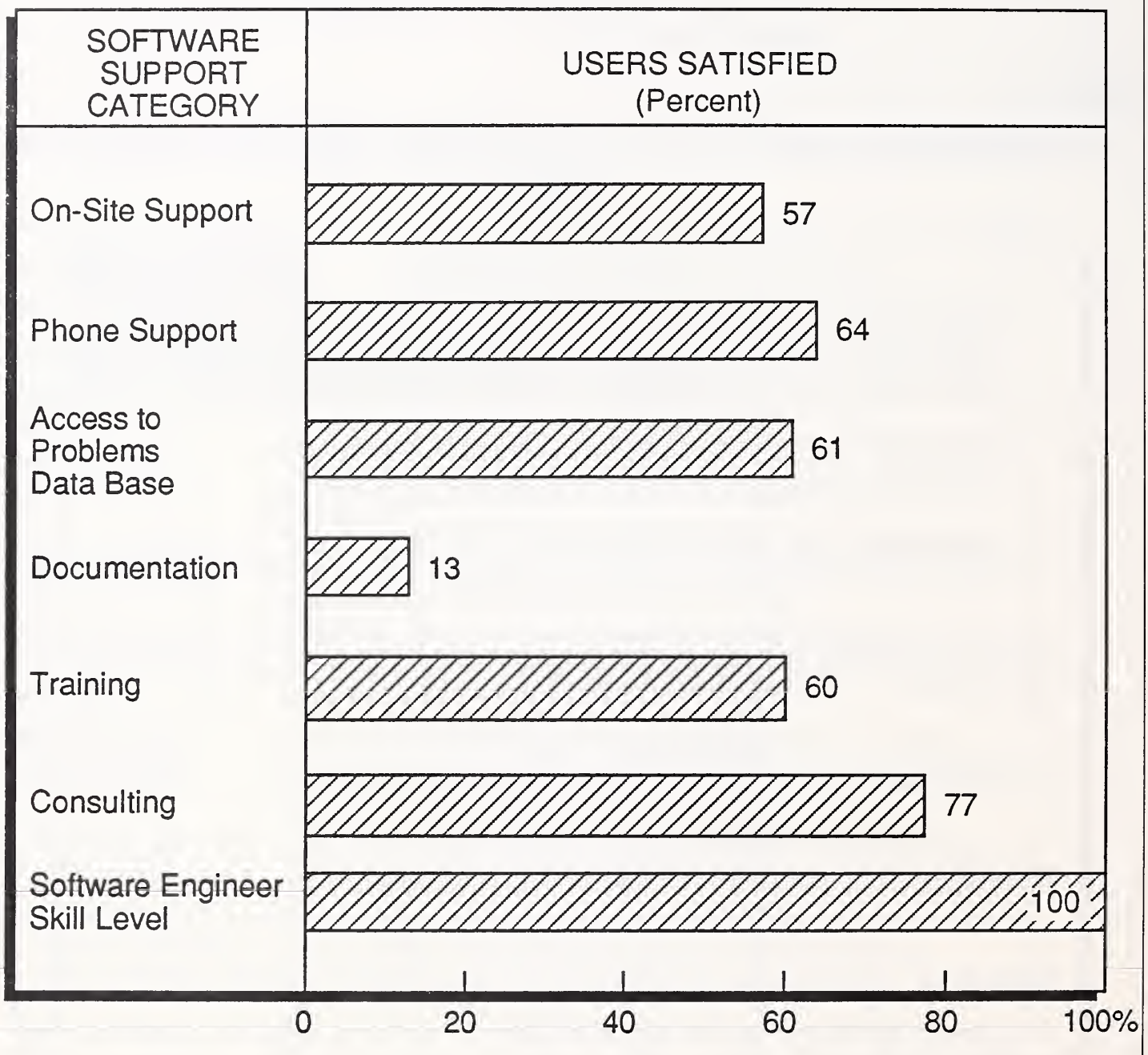
Scale: 1 = Low, 10 = High

Average Standard Error of the Mean: 0.5

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EXHIBIT IV-5

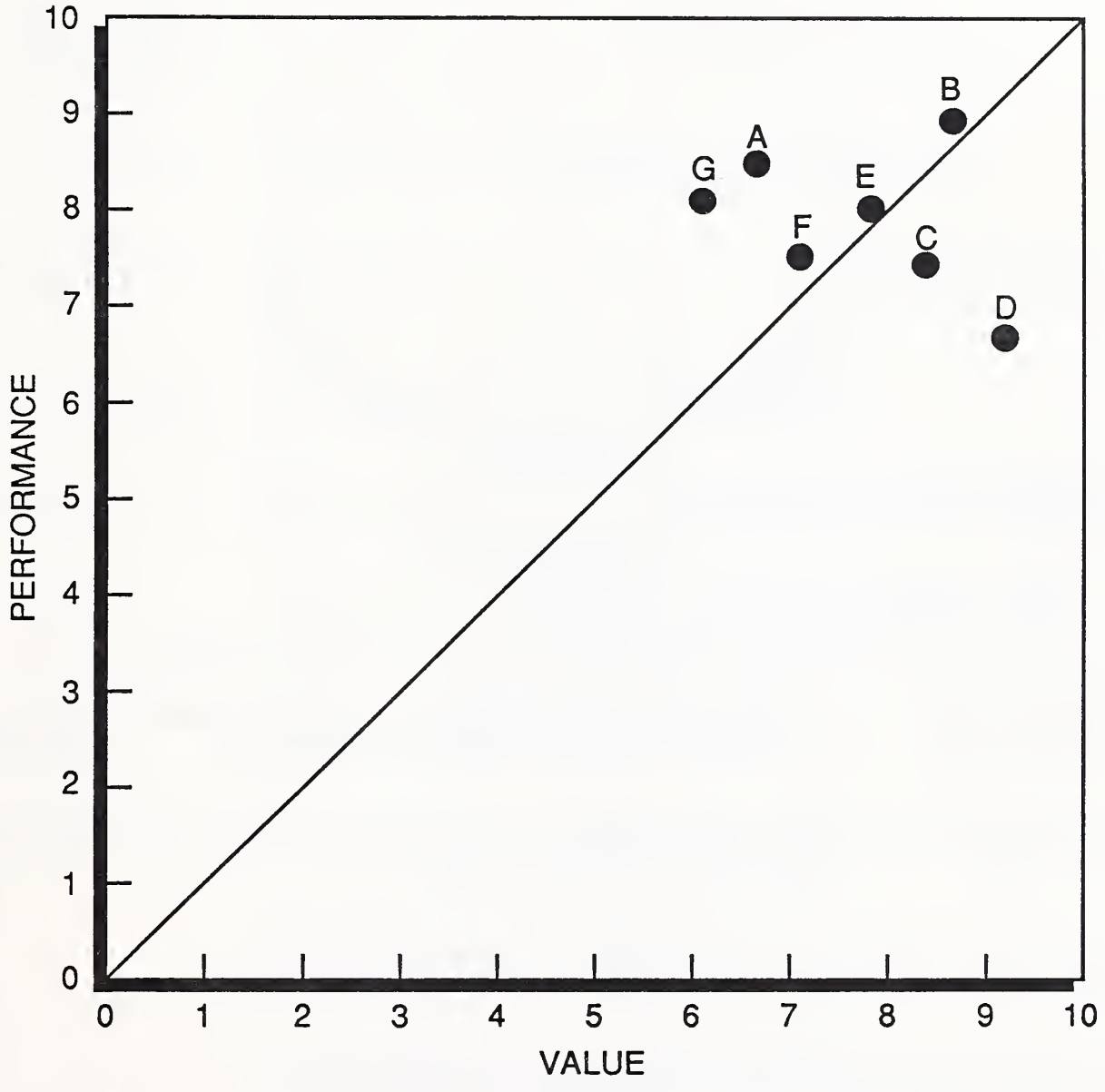
SOFTWARE SUPPORT SATISFACTION LEVELS
ADR



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EXHIBIT IV-6

SOFTWARE SUPPORT VENDOR PERFORMANCE VERSUS USER VALUE ADR

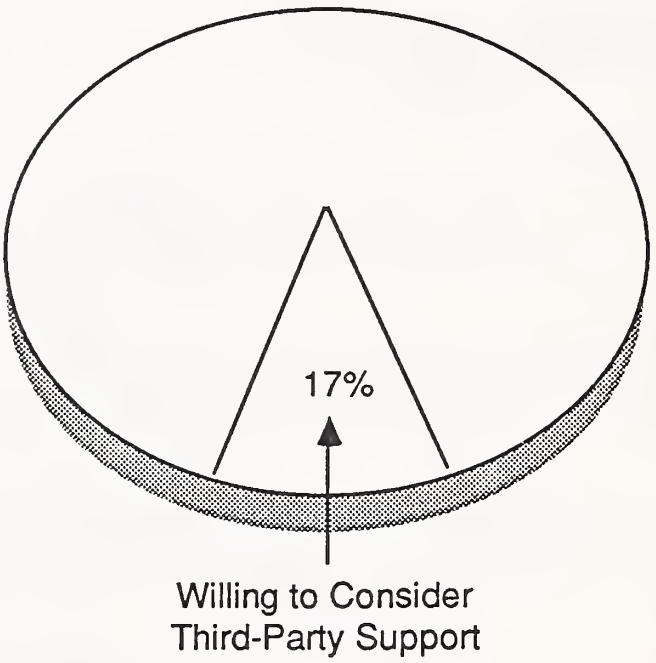


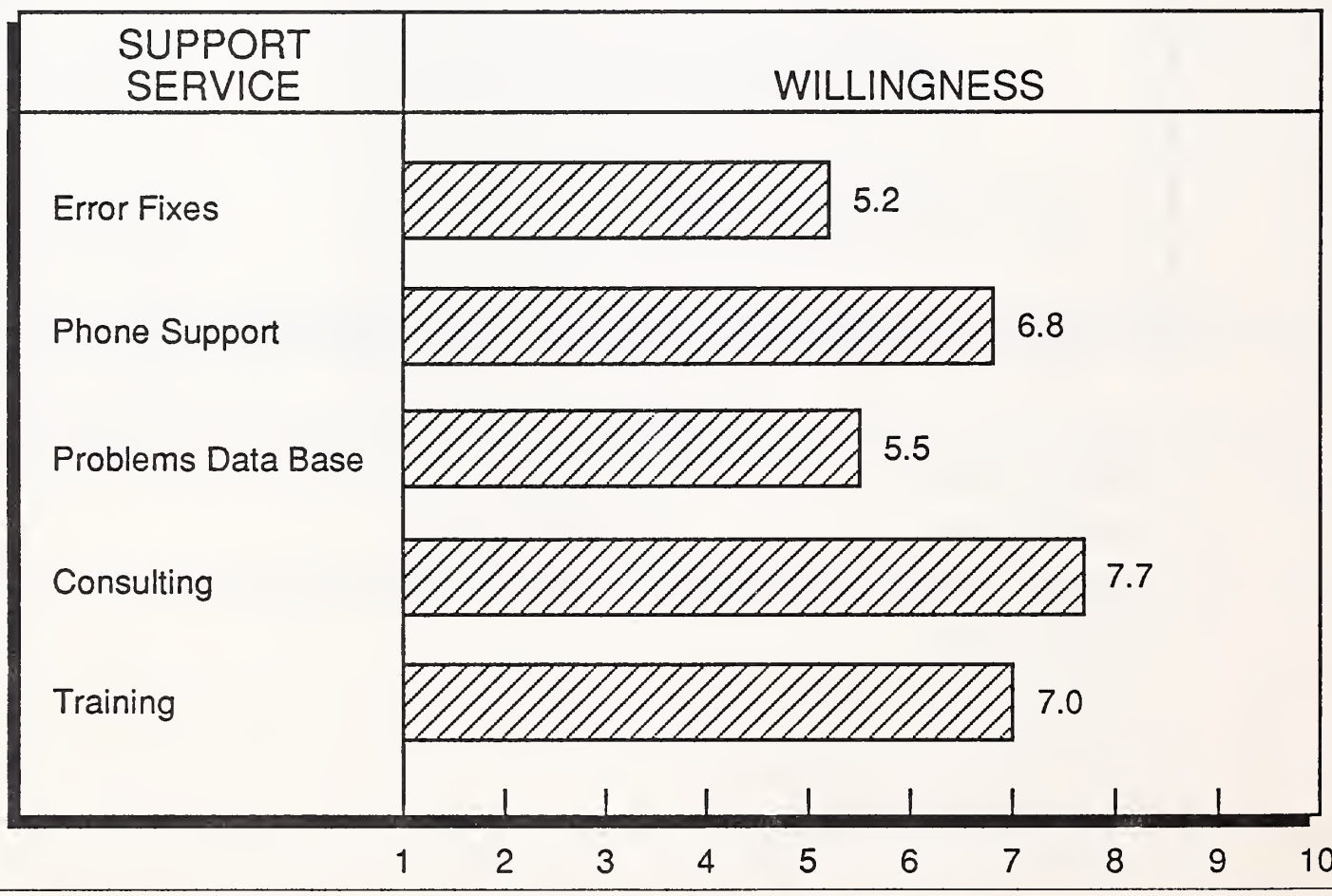
A = On-Site Support
B = Phone Support
C = Access to Problems Data Base
D = Documentation
E = Training
F = Consulting
G = Software Engineer Skill Level

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EXHIBIT IV-7

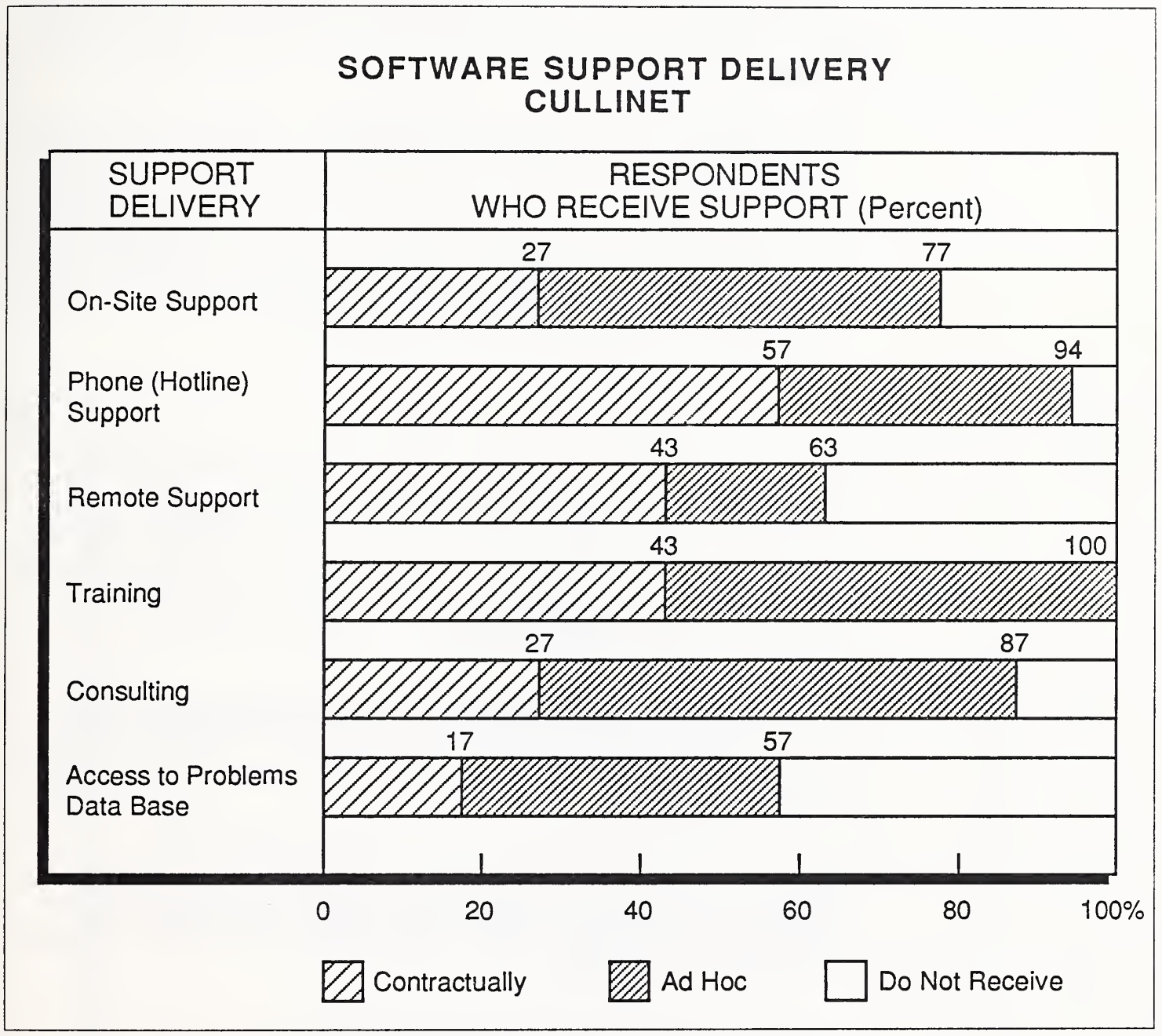
WILLINGNESS TO CONSIDER THIRD-PARTY SOFTWARE SUPPORT ADR





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EXHIBIT IV-8



Indeed, ADR performance in satisfying individual user needs is very poor in the problematic area of documentation, where ADR satisfied only 13% of its users in 1987, down significantly from 1986 (when ADR met the needs of 50% of its users). Eleven of the thirty respondents mentioned documentation as the single improvement desired, with typical comments such as "better clarity," "more complete documentation," and "more examples in the documentation."

In 1986, ADR users reported that phone support was problematic (only 47% of the 1986 sample was satisfied), with a localized group of users

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suggesting that software engineer skill level needed improvements. In 1987, software engineer skill level received much higher marks (satisfying all of the ADR sample), and, as a result, ADR user satisfaction with phone support also rose.

Still, ADR users appear very happy with their software products, and this satisfaction carries over into the support areas. Only 17% of the sample indicated willingness to try third-party support for their software, and most of that willingness centered around such operations/performance support activities as training and consulting. Apparently, ADR users are willing to gamble on the reliability of their products and would rather act to optimize the performance on an as-needed basis.

B

Cullinet

In 1987, INPUT interviewed thirty users of Cullinet software, broken down by product as follows: Fifteen users of IDMS (a communications control data base management system), nine users of IDD (an integrated data dictionary), three users of CULPRIT (a report generator), two users of ADS/Online (an applications development tool), and one user of INTERACT (a text editing program).

The Cullinet software analyzed ran on IBM and plug-compatible mainframes, broken down as follows: Thirteen IBM 303Xs, eleven 43XXs, two NAS AS/8XXXs, two Amdahl 58XXs, and one each of Amdahl 470 and Magnuson M80.

Most of the software packages carried license fees that ran between $27,000 (for CULPRIT) to $60,000 (for IDMS). On average, Cullinet users paid 12.9% for annual support fees; however, the range of response was fairly broad (2-40%).

Exhibit IV-1 shows how software support is typically delivered to Cullinet users. Most often, Cullinet users receive their support via the telephone, as 57% of the sample reported that they contracted for this service. Few opt for on-site support and even less contract for access to a problems data base (in fact, only 57% of the users reported any contact with such a data base).

Relatively few users of Cullinet software are experienced with remote support as only 43% of the sample reported that they receive remote support as a part of their support contract and 37% said that they had no experience at all with remote support.

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Exhibit IV-9 shows that Cullinet users reported that they experienced fewer major problems than the entire sample (0.2 per month versus 0.4 for the entire sample), as well as fewer minor problems (1.4 versus 1.5 per month). The Cullinet sample also reported that turnaround time for major problems was faster than the entire sample (13.1 hours versus 20.6 for the entire sample).

EXHIBIT IV-9

SOFTWARE SUPPORT PERFORMANCE
CULLINET

SUPPORT COMPONENT	
Number of Major Problems Reported per Month	0.2
Number of Major Problems Resolved per Month	0.2
Turnaround Time of Major Problems (Hours)	13.1
Number of Minor Problems Reported per Month	1.4
Number of Minor Problems Resolved per Month	1.3
Turnaround Time of Minor Problems (Hours)	32.6

More problematic was Cullinet performance in resolving minor problems. The users reported that some minor problems go unsolved (presumably resolved by mailed revisions sent later). The relatively long turnaround also indicates an area of concern, suggesting that mailed revisions are frequently relied on to resolve minor "bugs." The danger of relying on mailed revisions is that users frequently don't realize that the "bug" has

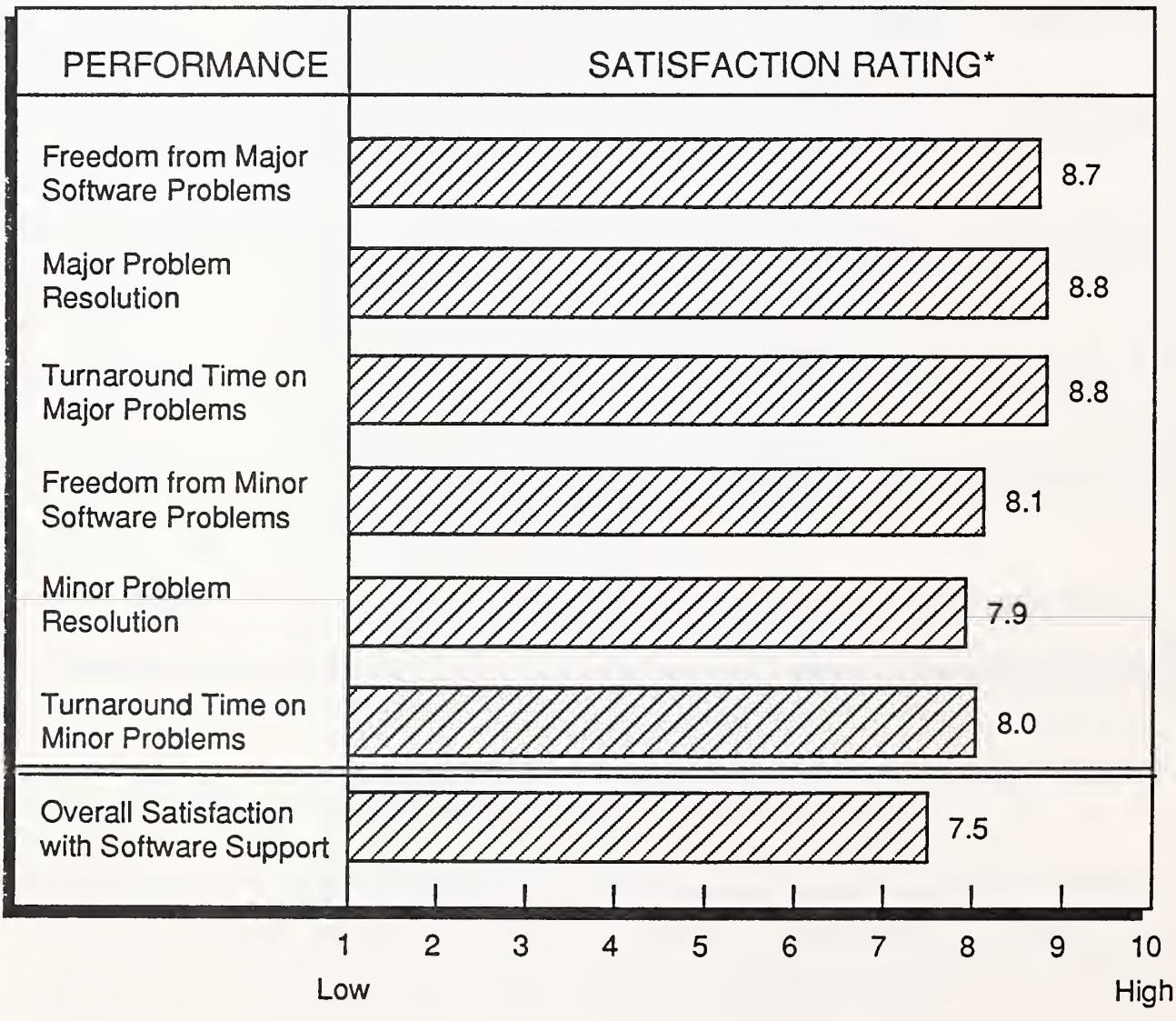
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has been rectified (which could account for the discrepancy between minor problems reported and resolved), even though the vendor documents the "improvements" contained in the revised version (often in the form of a cover letter, but also in the actual documentation). This contributes to user dissatisfaction with both the support and the product itself.

Cullinet users demonstrated some level of dissatisfaction with their software package's freedom from minor problems and their vendor's ability to overcome those problems that do occur, as shown in Exhibit IV-10. More importantly, user satisfaction with their overall support was significantly lower than the entire software user sample (rated 7.5 on a scale of 10, versus 8.2 for the entire sample).

EXHIBIT IV-10

USER SATISFACTION WITH SOFTWARE SUPPORT PERFORMANCE
CULLINET



*Average Standard Error of the Mean: 0.3

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Exhibits IV-11 through IV-13 take a closer examination of Cullinet support performance as reported by the 1987 survey group. Exhibit IV-11 indicates that Cullinet users place the greatest value on their software support engineer's skill level, phone support, and documentation. Exhibit IV-12 shows that Cullinet manages to satisfy the majority of their users' needs in each of these areas; however, Cullinet satisfies at least two-thirds of its customers in only one area (phone support).

EXHIBIT IV-11

SOFTWARE SUPPORT VALUE/PERFORMANCE LEVELS CULLINET

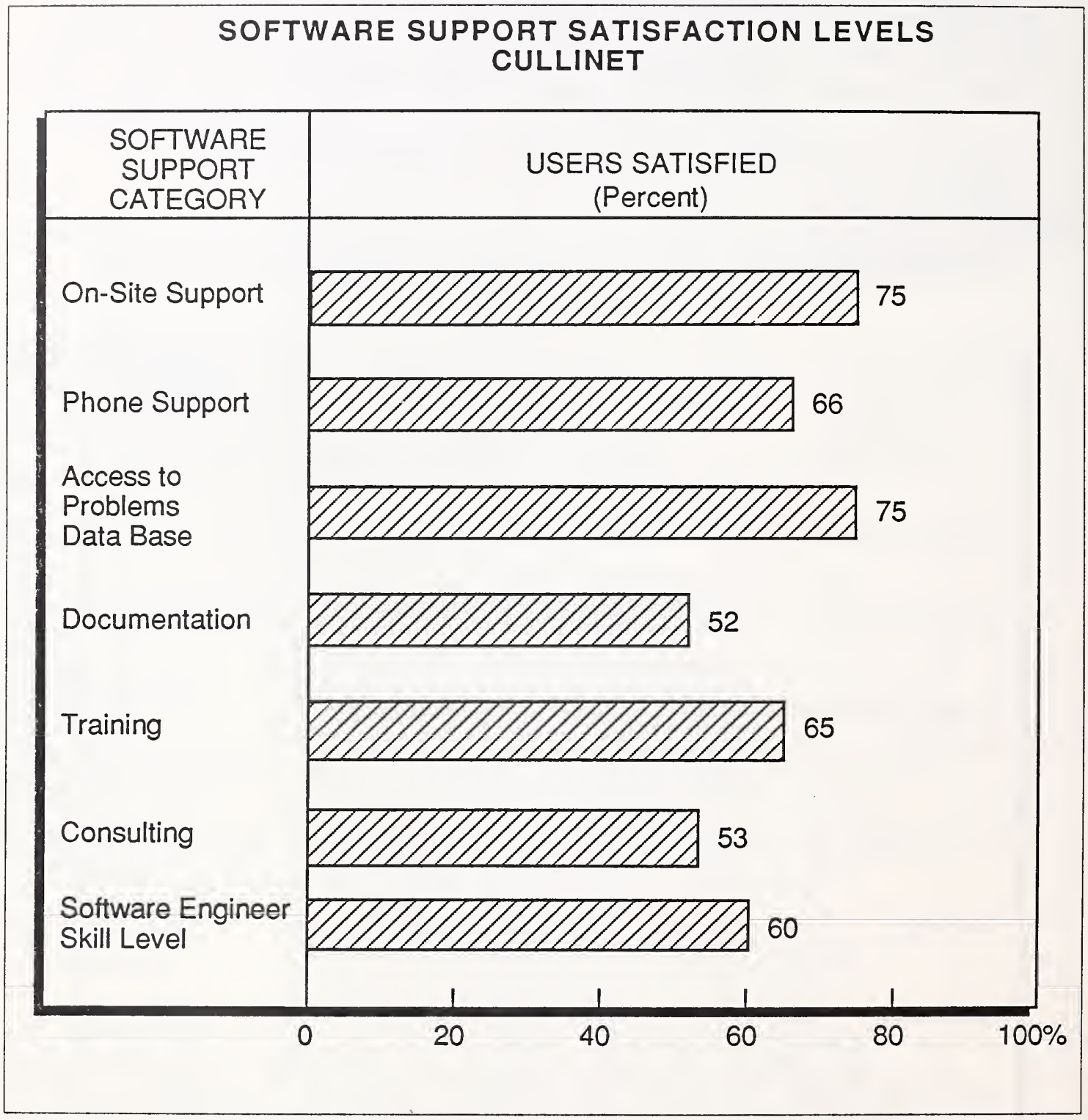
SOFTWARE SUPPORT CATEGORY	LEVEL OF SUPPORT		PERFORMANCE EXCEEDS (FALLS BELOW) USER VALUE
	VALUE	PERFORMANCE	
On-Site Support	4.8	6.1	1.3
Phone Support	8.1	7.9	(0.2)
Access to Problems Data Base	7.3	8.0	0.7
Documentation	7.9	7.2	(0.7)
Training	7.3	6.6	(0.7)
Consulting	7.2	6.8	(0.4)
Software Engineer Skill Level	9.1	8.3	(0.8)

Scale: 1 = Low, 10 = High

Average Standard Error of the Mean: 0.4

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EXHIBIT IV-12

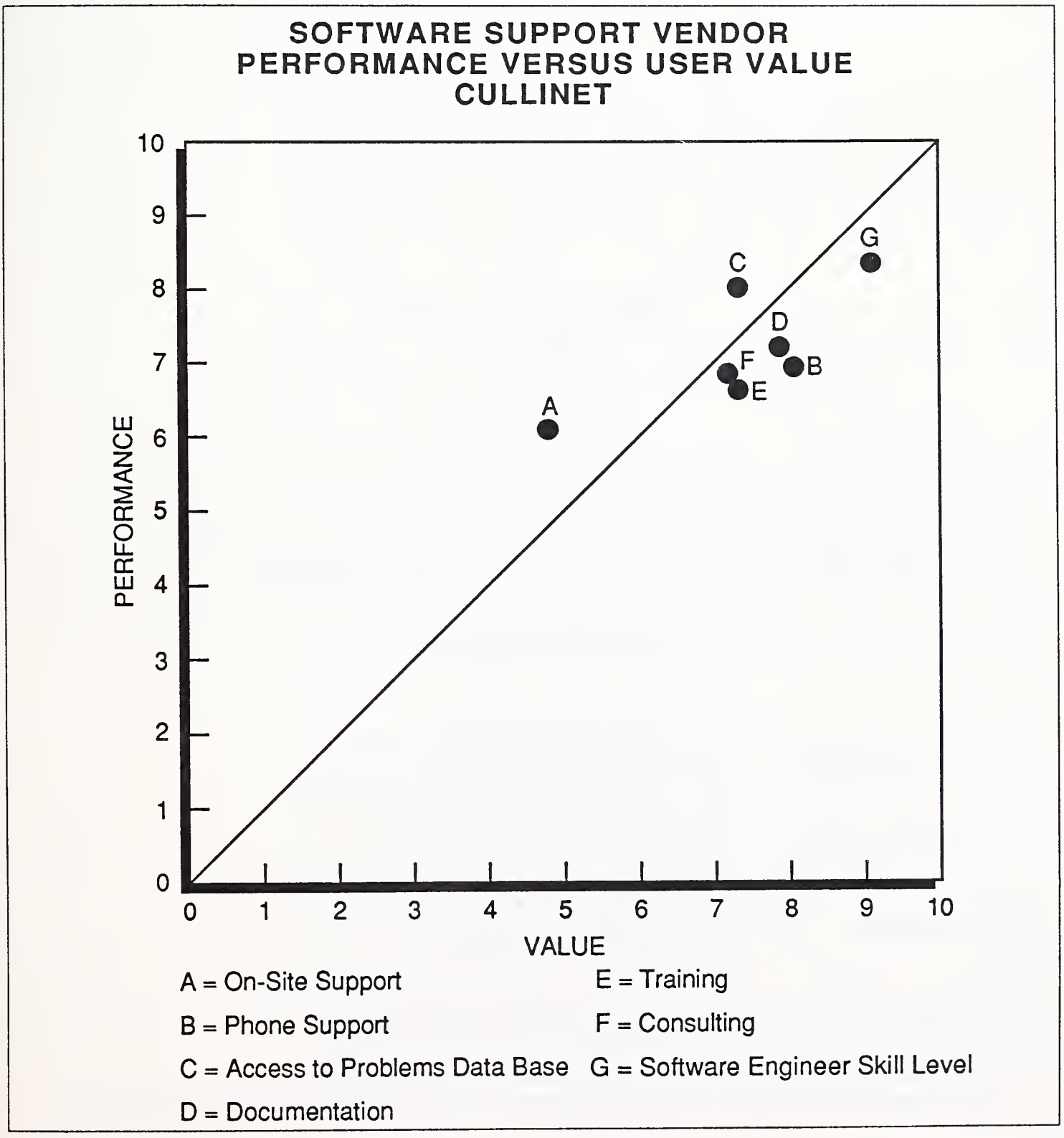


When asked what single improvement Cullinet users desire most, users most often mentioned documentation and software support personnel. Users wanted more comprehensive documentation ("documentation is too vague") and better communication with their support personnel.

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Exhibit IV-13 graphically presents the discrepancy between user-reported value assigned to phone support, documentation, training, consulting, and software engineer skill level versus the actual performance reported by Cullinet.

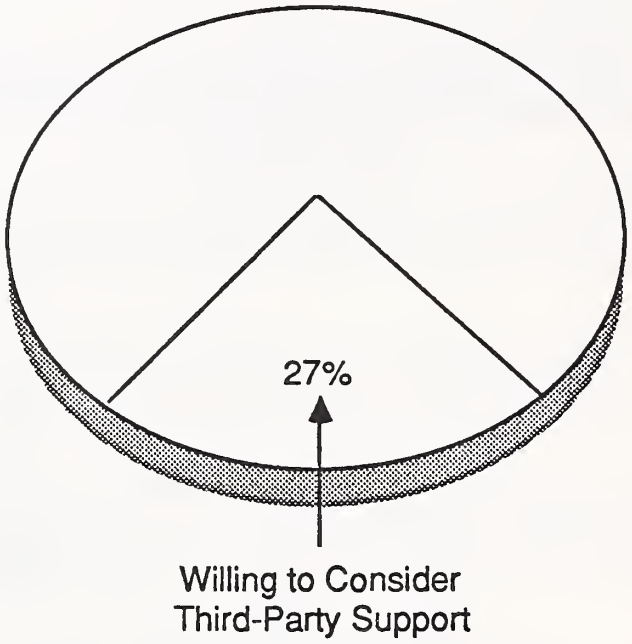
EXHIBIT IV-13

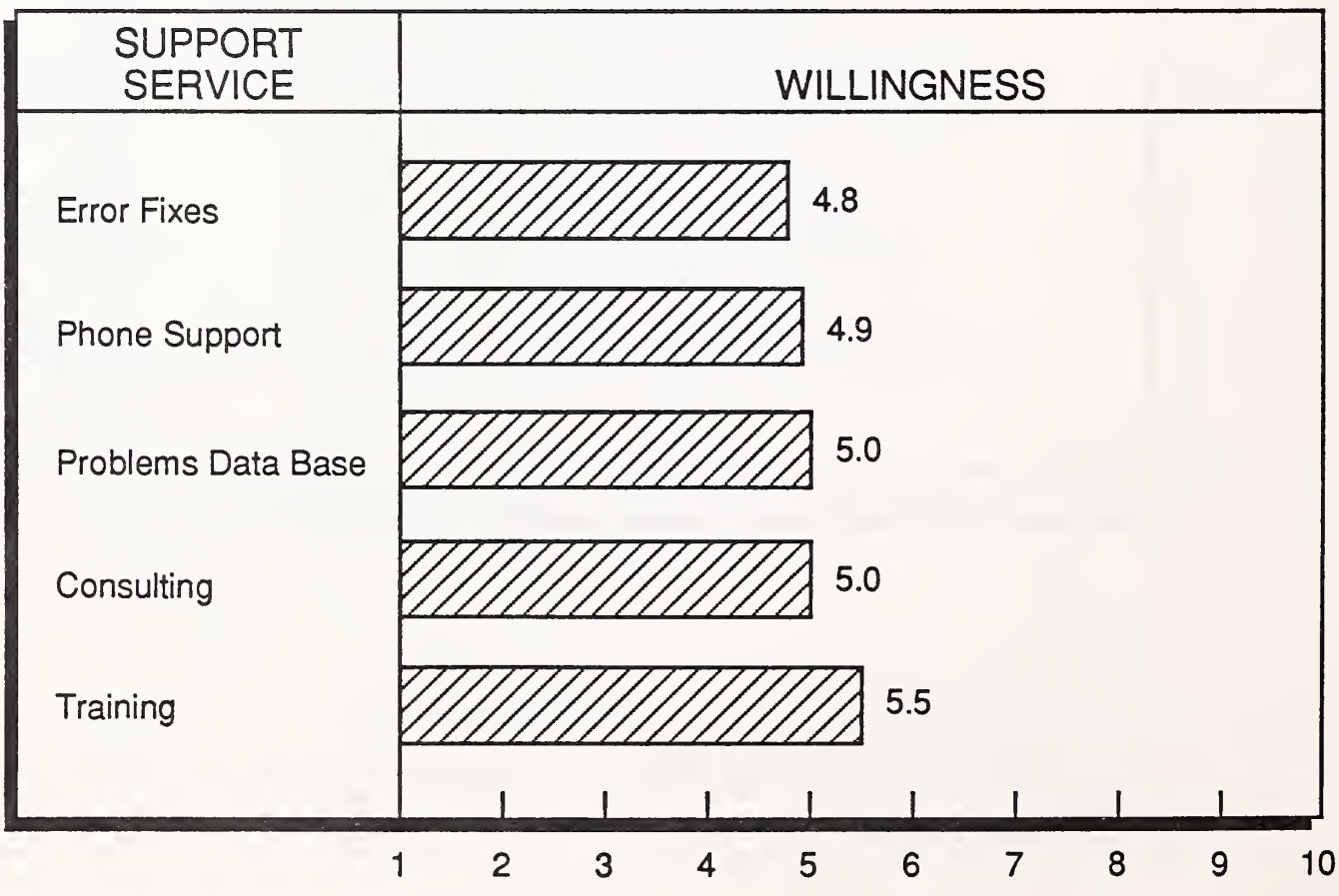


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EXHIBIT IV-14

WILLINGNESS TO CONSIDER THIRD-PARTY SOFTWARE SUPPORT CULLINET





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Cullinet users were among the most willing group of users (third after MSA and NCA) with regard to trying third-party software support, as shown in Exhibit IV-14. Twenty-seven percent of the Cullinet sample indicated that they were willing to consider alternative sources for their support. Although they indicated the greatest willingness to consider third-party training, user willingness was fairly evenly spread over all of the support services analyzed.

C

DEC

Along with being a major vendor of computer equipment, Digital Equipment Corporation (DEC) is a leading vendor of software packages for those computer systems. In 1987, INPUT surveyed thirty-one users of DEC software concerning the support that they received. All of these surveys were done with users of DEC's All-in-1, an integrated office automation program designed to run on any VAX hardware.

The DEC sample can be further broken by processor as follows: Fifteen DEC VAX/78Xs, eight DEC VAX/75Xs, and the remaining eight split evenly between the new VAX 8XXXs and MicroVAX IIs.

DEC offers many different levels of support for its software, just as it does for its hardware systems. Most users choose Basic Service, which provides telephone support, access to DEC's problems data base (called DSIN, Digital's Software Information Network), media and documentation updates, and technical newsletters. DEC also offers a premium service level, called DEC Support Service, which adds on-site and remote installations of updates, preventive maintenance, remote remedial maintenance, and on-site remedial support during normal business hours when necessary.

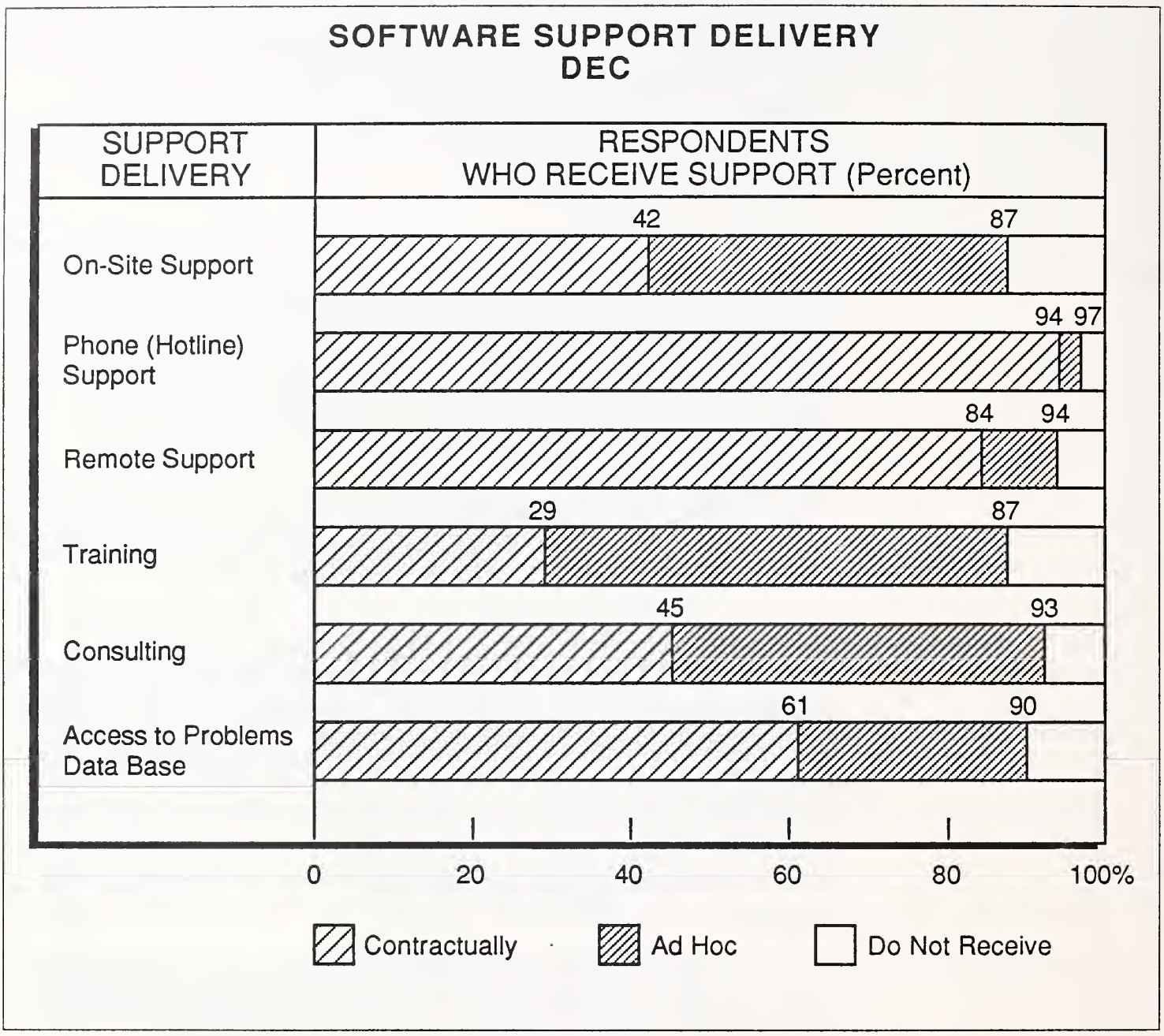
The 1987 All-in-1 sample reported that they paid approximately 20% for annual support, suggesting that they opted for the DEC Support Service level versus Basic, which typically runs around 14% annually.

Exhibit IV-15 shows that 42% of the DEC sample has had to receive support on-site during contracted hours and another 45% experienced on-site support on an ad hoc (billed additionally) basis. Still, most software support is delivered via the telephone.

The All-in-1 users also made use of remote support (84%) and the DSIN problems data base. On the other hand, few DEC users, like most other software users, contracted for additional training or consulting services.

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EXHIBIT IV-15



The emphasis on remote support, along with DEC's excellent support coverage (via the telephone support center in Colorado Springs, CO), resulted in extremely prompt problem resolution (shown in Exhibit IV-16), particularly for major software problems. Exhibit IV-17 indicates that All-in-1 users were extremely satisfied with their software's freedom from major problems (rated 9.7 on a scale of 10), as well as problem resolution and turnaround time (rated 9.4 and 9.5, respectively).

DEC was less successful in satisfying its users with respect to minor problems, specifically freedom from problems and minor problem resolution.

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EXHIBIT IV-16

SOFTWARE SUPPORT PERFORMANCE
DEC

SUPPORT COMPONENT	
Number of Major Problems Reported per Month	0.3
Number of Major Problems Resolved per Month	0.3
Turnaround Time of Major Problems (Hours)	6.5
Number of Minor Problems Reported per Month	3.8
Number of Minor Problems Resolved per Month	3.2
Turnaround Time of Minor Problems (Hours)	12.3

User satisfaction with overall software support is rated highly, yet user satisfaction with specific support services is significantly lower, as shown in Exhibits IV-18 through IV-20. Exhibit IV-18 indicates that DEC users have high support expectations for all areas of support, perhaps a result of DEC's reputation and the marketing of its support services. Thus, it becomes more difficult to meet the high expectations of its users, as indicated in Exhibit IV-19.

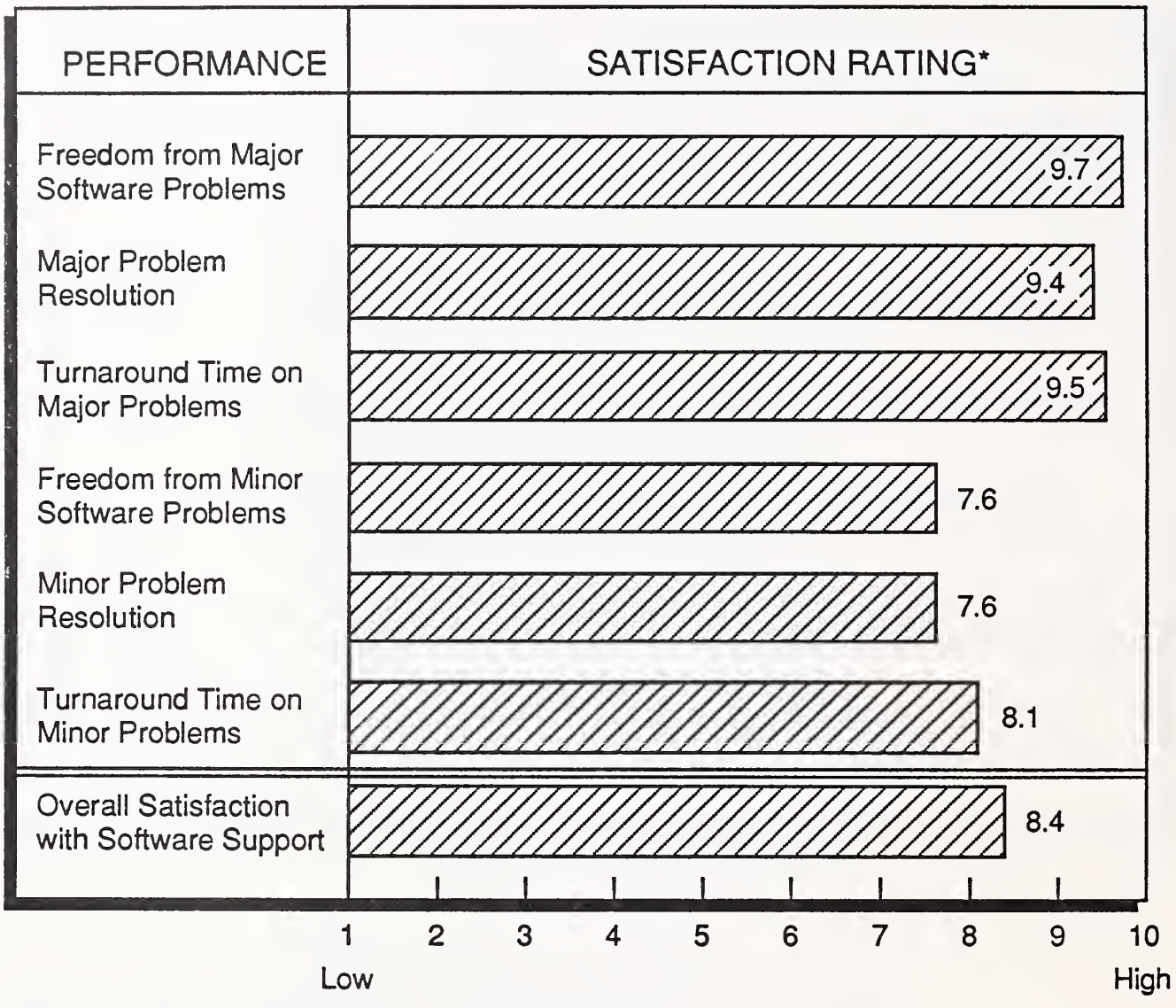
When asked to elaborate on the poor ratings given to DEC software support performance, the All-in-1 users responded with perceived needs:

- "Better documentation" - six respondents.
- "Faster responses" - three respondents.

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EXHIBIT IV-17

USER SATISFACTION WITH SOFTWARE SUPPORT PERFORMANCE DEC



*Average Standard Error of the Mean: 0.3

- "Improved performance of the software" - three respondents.
- "Better training; too complicated" - two respondents.

Still, these users are extremely loyal to their software vendor, as evident in Exhibit IV-21, which shows that although DEC users report that DEC

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EXHIBIT IV-18

SOFTWARE SUPPORT VALUE/PERFORMANCE LEVELS DEC

SOFTWARE SUPPORT CATEGORY	LEVEL OF SUPPORT		PERFORMANCE EXCEEDS (FALLS BELOW) USER VALUE
	VALUE	PERFORMANCE	
On-Site Support	8.7	7.7	(1.0)
Phone Support	8.7	7.6	(1.1)
Access to Problems Data Base	8.4	7.4	(1.0)
Documentation	8.9	7.1	(1.8)
Training	8.6	7.2	(1.4)
Consulting	8.7	7.3	(1.4)
Software Engineer Skill Level	9.3	7.9	(1.4)

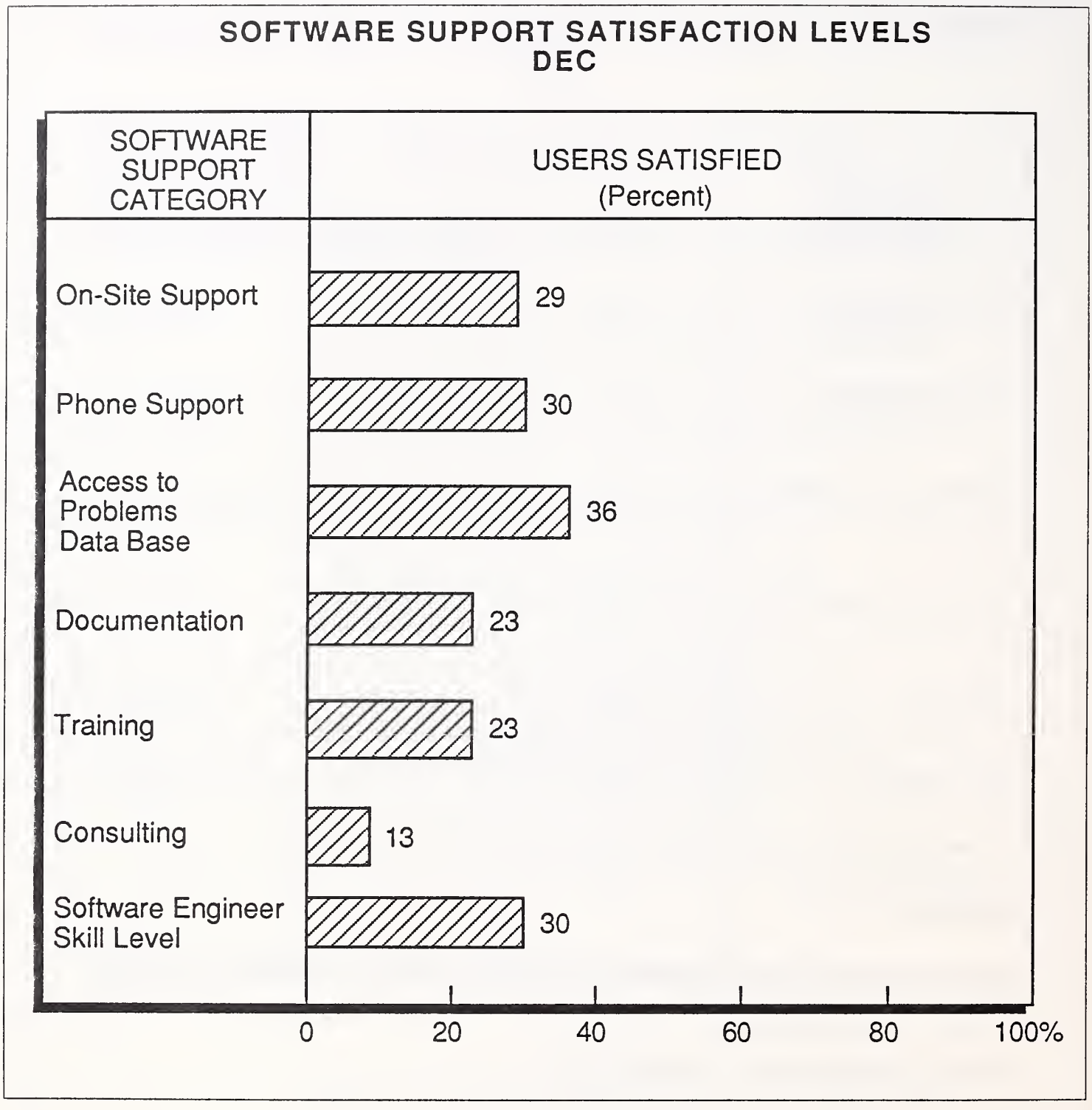
Scale: 1 = Low, 10 = High

Average Standard Error of the Mean: 0.2

does not meet any of their other extremely high support needs, none of the All-in-1 users were willing to consider third-party sources as an alternative to their current support vendor.

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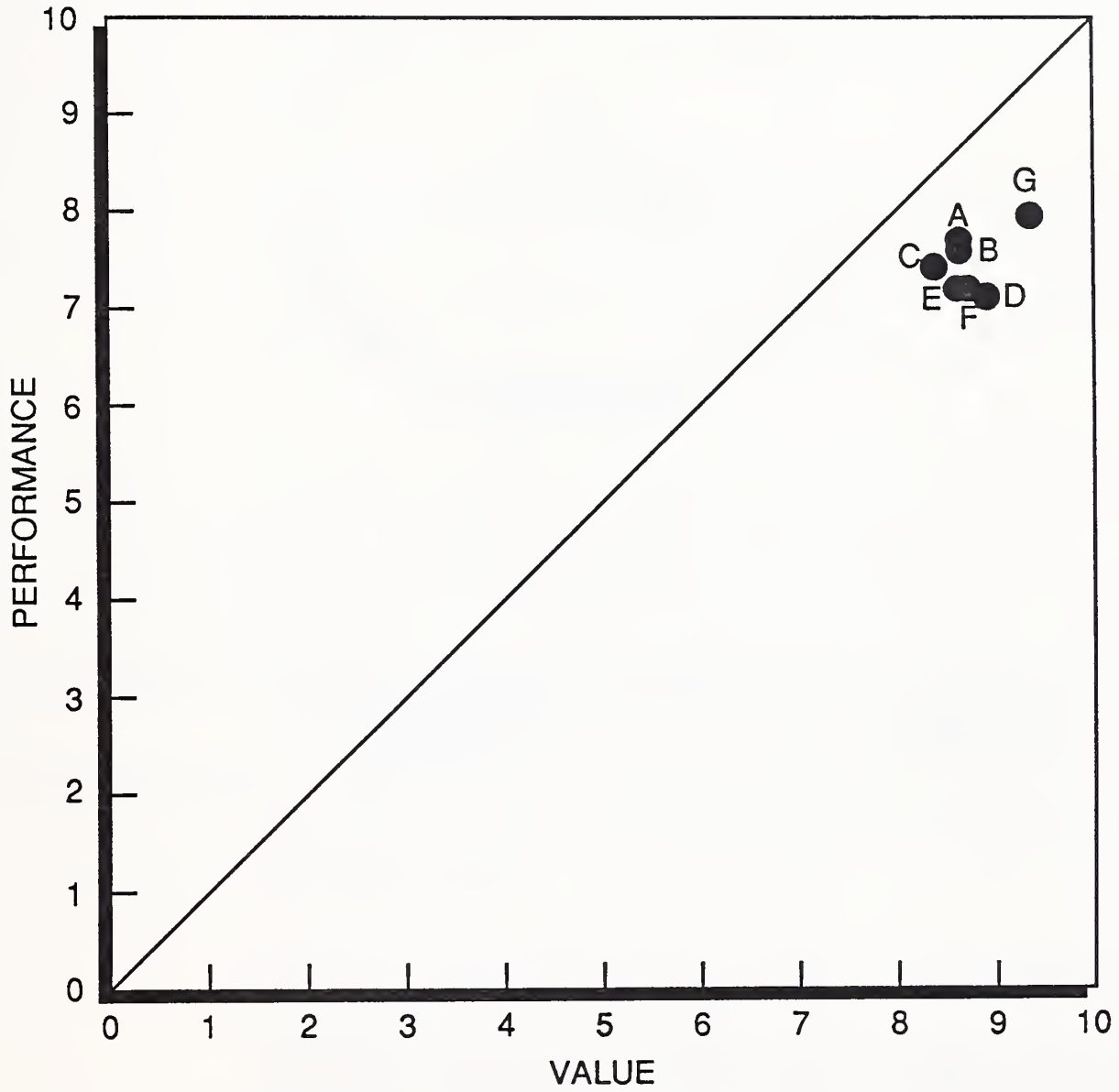
EXHIBIT IV-19



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EXHIBIT IV-20

SOFTWARE SUPPORT VENDOR PERFORMANCE VERSUS USER VALUE DEC

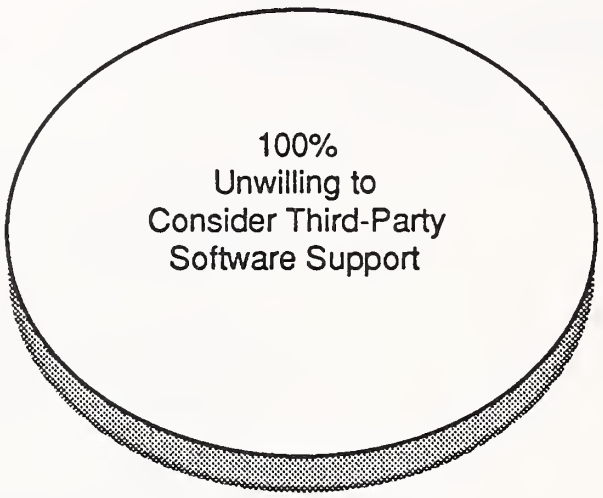


A = On-Site Support
B = Phone Support
C = Access to Problems Data Base
D = Documentation
E = Training
F = Consulting
G = Software Engineer Skill Level

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EXHIBIT IV-21

WILLINGNESS TO CONSIDER THIRD-PARTY SOFTWARE SUPPORT DEC



SUPPORT SERVICE	WILLINGNESS (Percent)
Error Fixes	0
Phone Support	0
Problems Data Base	0
Consulting	0
Training	0

1 2 3 4 5 6 7 8 9 10

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D

IBM

In 1987, INPUT interviewed thirty users of the following IBM software products: twenty-six users of Manufacturing Accounting and Production Information Control (MAPICS), three users of Distributed Office Support System (DISSOS), and one user of Communications Oriented Production Information and Control System (COPICS). The sample can also be broken down by the hardware that the software ran on: twenty System/36s, four System/34s, two System/38s, two 308Xs, one 43XX, and one 309X.

MAPICS is a modular manufacturing software system made up of at least thirteen separate but integrated modules that cost between $1,650 and $6,100 (one-time charge). COPICS is also modular in design, with modules priced between $2,375 and $20,480. A core system DISOSS runs between $29,000-$31,000 (one-time charge). The sample reported that they paid an average of 14.5% annually for support.

As a company, IBM is well known for its support, a factor that leads many users to IBM in the first place. Exhibit IV-22 presents the IBM sample's experience with various software support services and the company's delivery methodology. As with most other software vendors, IBM provides most support, contractually and on an ad hoc basis, via telephone support, usually in conjunction with a problems data base. While two-thirds of the users did not contract for on-site support, virtually all of the users reported receiving on-site support at some level.

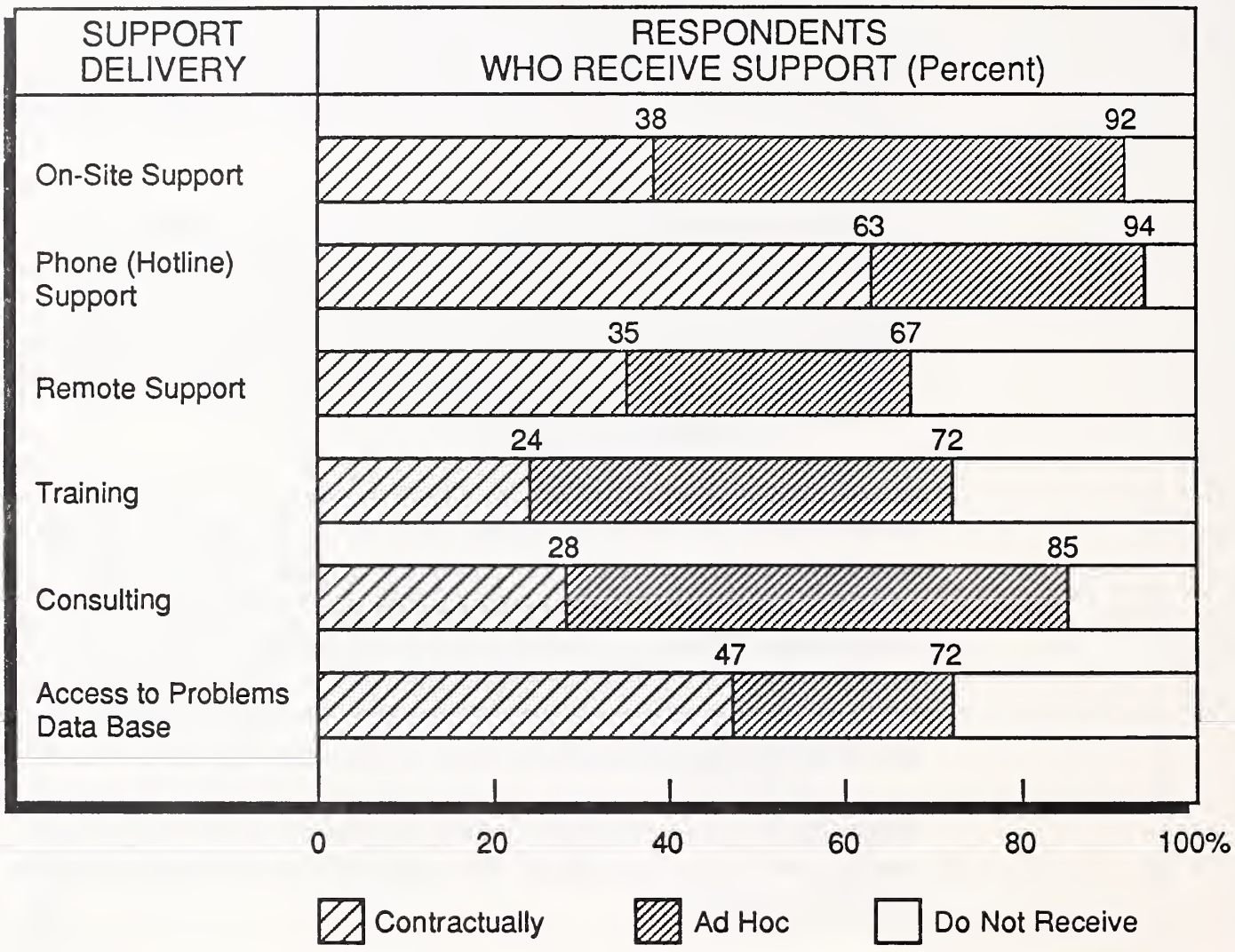
Relatively few users reported that they contract for either consulting or training services, yet most users reported some exposure to these service on an ad hoc basis.

Exhibit IV-23 shows that the IBM software was extremely reliable, averaging only one major problem every three months and just over one minor problem per month. Turnaround time on major problems took longer than on minor problems (20.2 hours versus 17.2 hours); users rated their satisfaction (in Exhibit IV-24) with major problem resolution turnaround time lower than with minor problem resolution turnaround time (8.6 on a scale of 10 compared to 8.9).

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EXHIBIT IV-22

SOFTWARE SUPPORT DELIVERY
IBM



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EXHIBIT IV-23

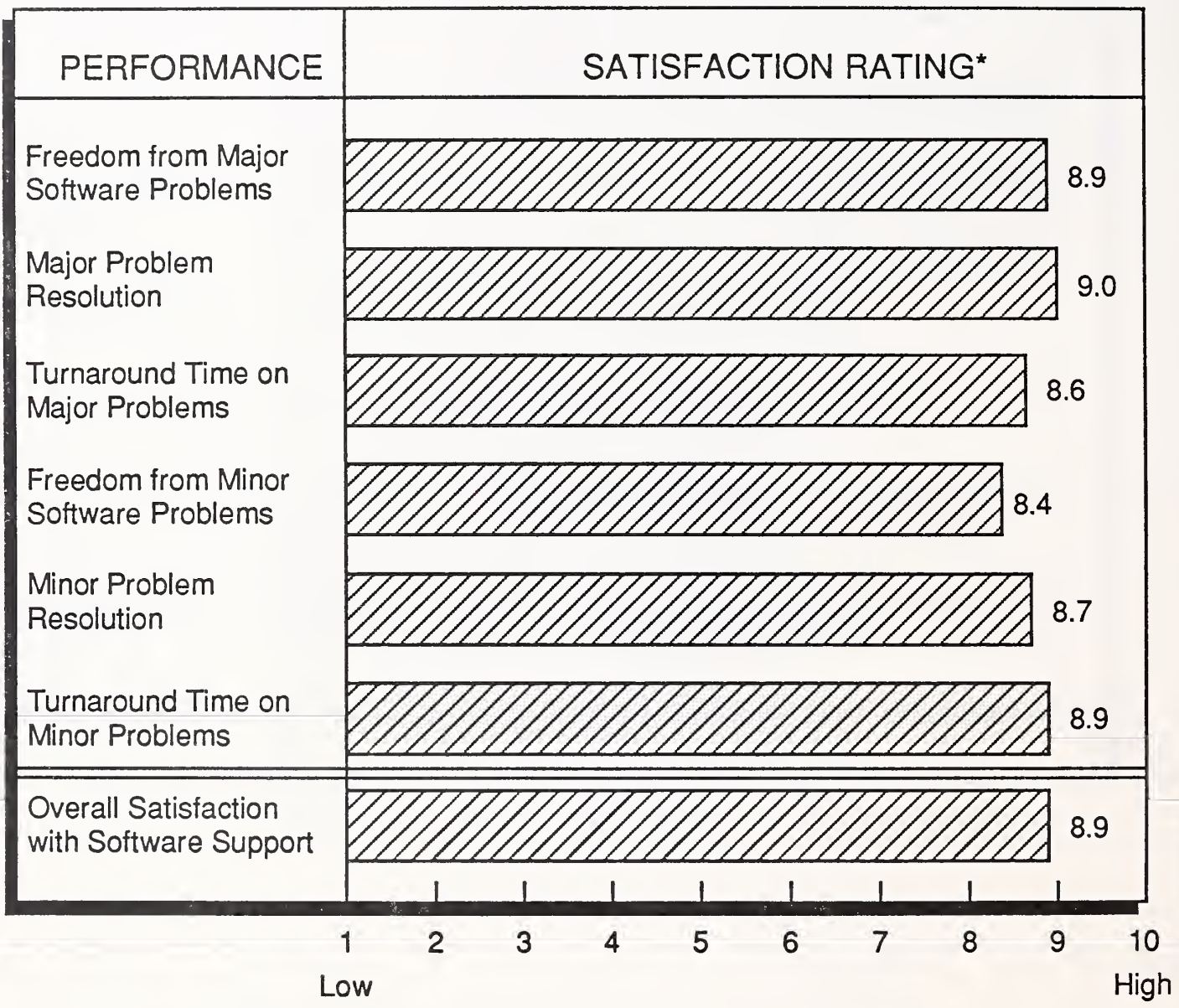
SOFTWARE SUPPORT PERFORMANCE
IBM

SUPPORT COMPONENT	
Number of Major Problems Reported per Month	0.3
Number of Major Problems Resolved per Month	0.3
Turnaround Time of Major Problems (Hours)	20.2
Number of Minor Problems Reported per Month	1.1
Number of Minor Problems Resolved per Month	1.1
Turnaround Time of Minor Problems (Hours)	17.2

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EXHIBIT IV-24

USER SATISFACTION WITH SOFTWARE SUPPORT PERFORMANCE IBM



*Average Standard Error of the Mean: 0.3

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Still, IBM users reported high satisfaction with their software package's reliability and the quality of support received. Exhibit IV-25 breaks down IBM software support performance by service component, indicating that IBM performance exceeds the value that its users assigned to each support service analyzed. IBM users placed the highest importance on documentation and software engineer skill level, and IBM succeeded

EXHIBIT IV-25

SOFTWARE SUPPORT VALUE/PERFORMANCE LEVELS IBM

SOFTWARE SUPPORT CATEGORY	LEVEL OF SUPPORT		PERFORMANCE EXCEEDS (FALLS BELOW) USER VALUE
	VALUE	PERFORMANCE	
On-Site Support	4.8	7.2	2.4
Phone Support	7.2	8.9	1.7
Access to Problems Data Base	6.6	8.8	2.2
Documentation	8.2	8.3	0.1
Training	6.8	7.5	0.7
Consulting	5.9	7.5	1.6
Software Engineer Skill Level	8.1	8.2	0.1

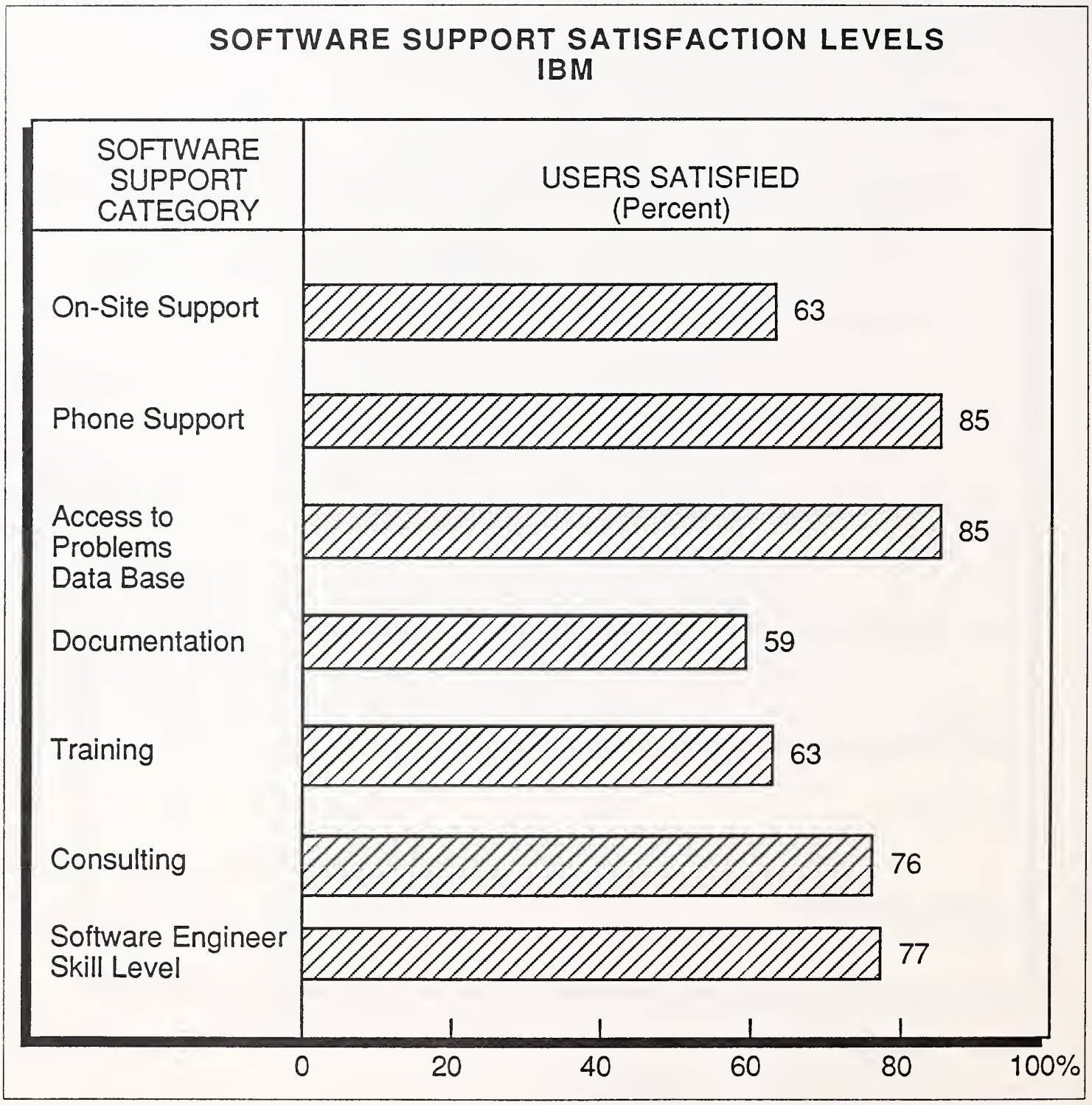
Scale: 1 = Low, 10 = High

Average Standard Error of the Mean: 0.6

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in satisfying its users even in these key areas. Exhibit IV-26 shows that IBM satisfied 59% of the IBM user sample's documentation needs and 77% of the users' requirements regarding software engineer skill level (compared to 43% and 64% for the entire software user sample). Only four of the thirty IBM users surveyed mentioned documentation as the single improvement desired.

EXHIBIT IV-26



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IBM is successful at satisfying its users' needs due to its ability to determine the specific support needs of its users and then provide support at that level. Exhibits IV-25 and IV-27 show that IBM users reported lower support requirements than other product groups, and in many cases, other support vendors provide better support (on an absolute basis), yet IBM usually receives better support satisfaction marks than most vendors due to this ability to provide just the right amount of support.

Even though IBM software support performance satisfies most users' needs, Exhibit VI-28 shows that 23% of the IBM sample were willing to consider a third-party source of software support, which is slightly higher than the software user sample on the whole. This may be due to the large percentage of IBM respondents who used System/3Xs, which are under increased competition from third-party maintenance firms that are vying for the hardware maintenance business. This increased pressure from TPMs may have increased the visibility of alternative support sources in general. Nonetheless, IBM users seem quite willing to consider alternative training sources.

E

McCormack & Dodge

McCormack & Dodge is a leading vendor of accounting software for the IBM mainframe environment. In 1987, INPUT interviewed thirty users of the following M&D software (in some combination): fifteen users of A/P Plus (an accounts payable package), 12 users of GL:Millennium (a general ledger package), ten users of P/A Plus (a fixed assets package), four users of A/R Plus (a payroll reporting package), and two users of HR:Millennium (a personnel management package).

The sample can be further broken down into the following machine types: Thirteen IBM 30XXs, twelve IBM 43XXs, two Amdahl 470s, two Honeywell DPS8s, and one NAS AS/8XXX.

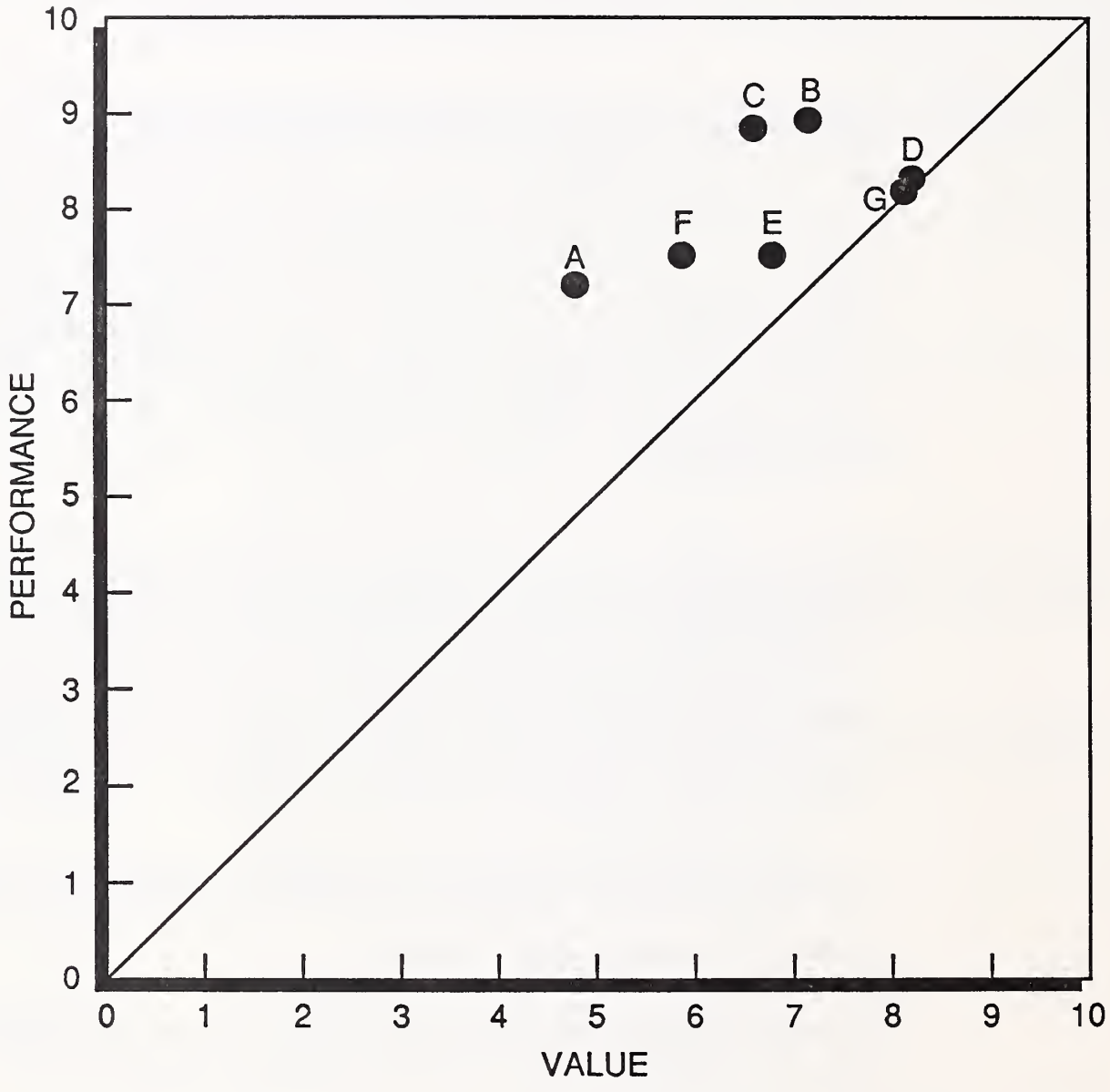
The McCormack & Dodge software analyzed is priced from $10,000 to $40,000 per package, and the average support price reported by the sample was 12.7% of the license fee.

McCormack & Dodge emphasizes its training services, which include both data processing and accounting curriculum. In addition, McCormack & Dodge offers computer-based training on selected accounting packages.

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EXHIBIT IV-27

SOFTWARE SUPPORT VENDOR PERFORMANCE VERSUS USER VALUE IBM

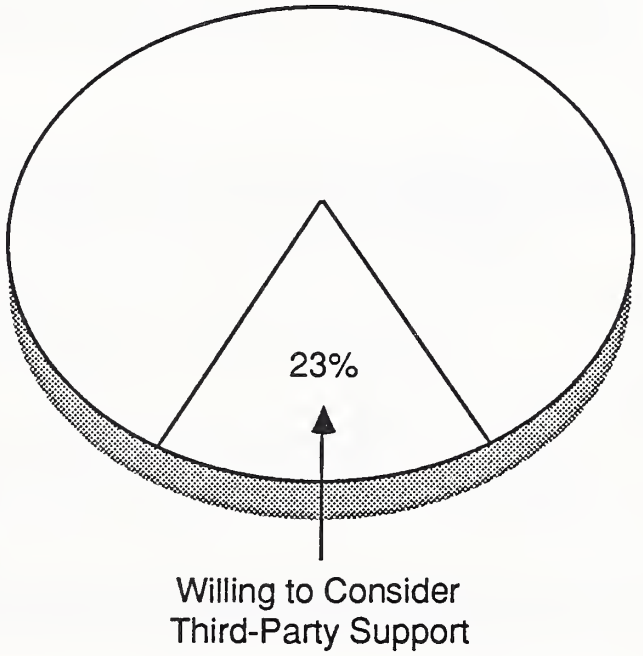


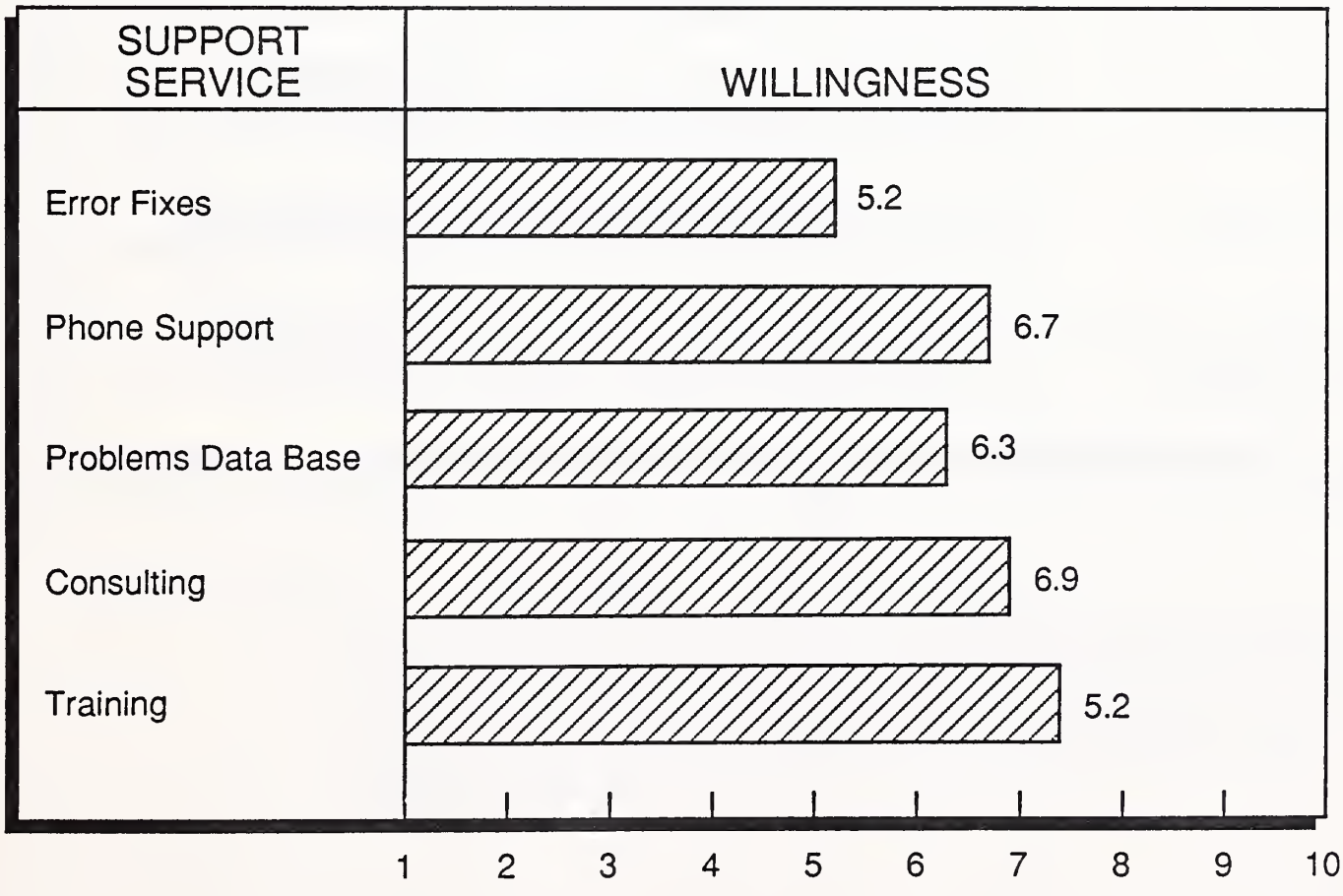
A = On-Site Support
B = Phone Support
C = Access to Problems Data Base
D = Documentation
E = Training
F = Consulting
G = Software Engineer Skill Level

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EXHIBIT IV-28

WILLINGNESS TO CONSIDER THIRD-PARTY SOFTWARE SUPPORT IBM

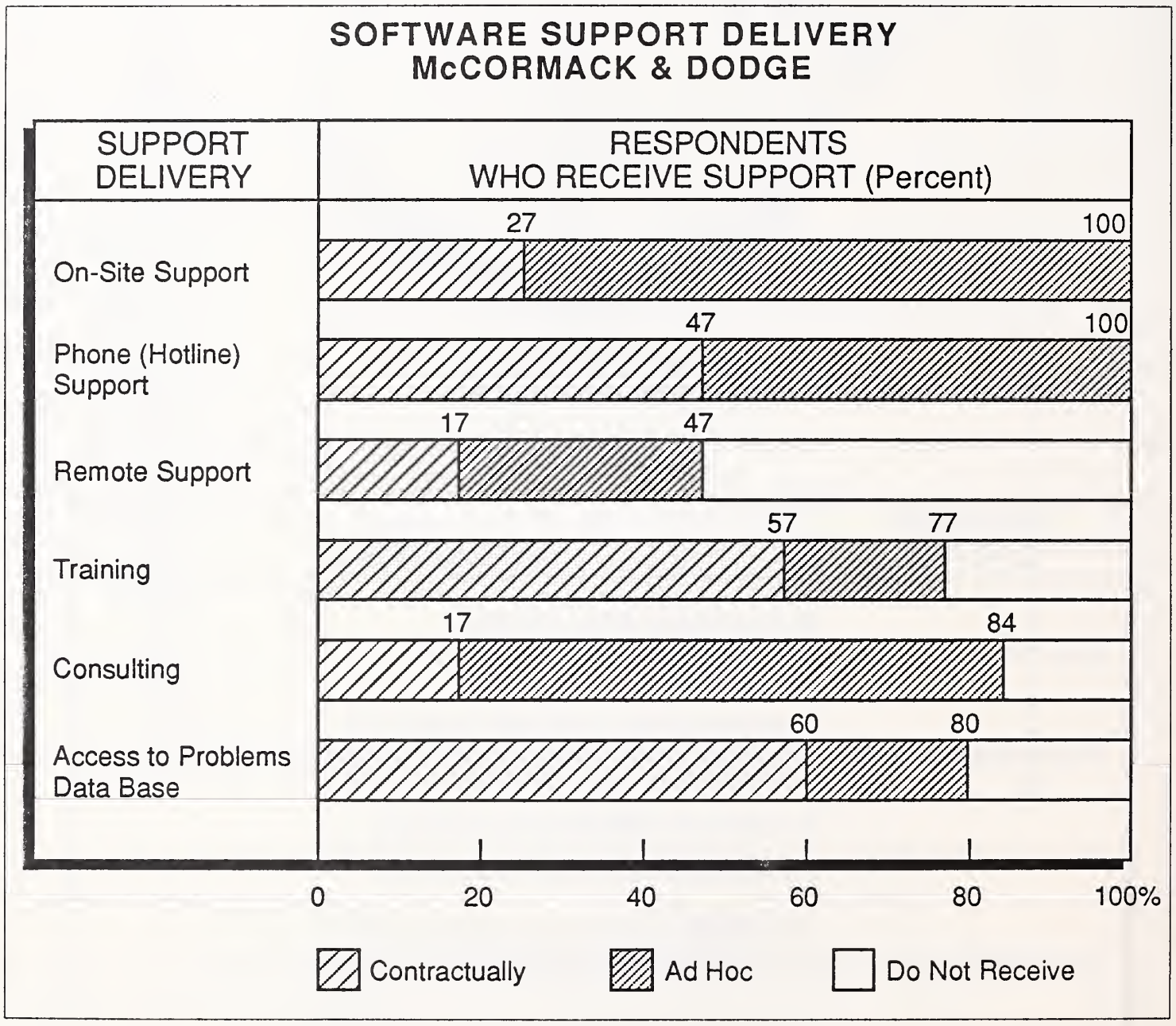




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It is apparent from Exhibit IV-29 that few users contract for support from McCormack & Dodge since only 27% of the sample reported that they receive on-site support contractually and 47% reported that they contract for phone support (although all of the users reported that they had some experience with on-site and phone support on an ad hoc basis). What support services the users did contract for were training (57% of the sample) and access to problems data bases (60%).

EXHIBIT IV-29



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Exhibit IV-30 attests to the commendable reliability of the McCormack & Dodge software products analyzed. The user sample reported only one major problem every five months, so few that it was impossible to measure average turnaround on major problem resolution. The users also reported that their software was relatively free from minor problems, although some problems appear to go unresolved (presumably resolved in a later revision).

EXHIBIT IV-30

SOFTWARE SUPPORT PERFORMANCE
McCORMACK & DODGE

SUPPORT COMPONENT	
Number of Major Problems Reported per Month	0.2
Number of Major Problems Resolved per Month	0.2
Turnaround Time of Major Problems (Hours)	*
Number of Minor Problems Reported per Month	1.2
Number of Minor Problems Resolved per Month	1.0
Turnaround Time of Minor Problems (Hours)	28.1

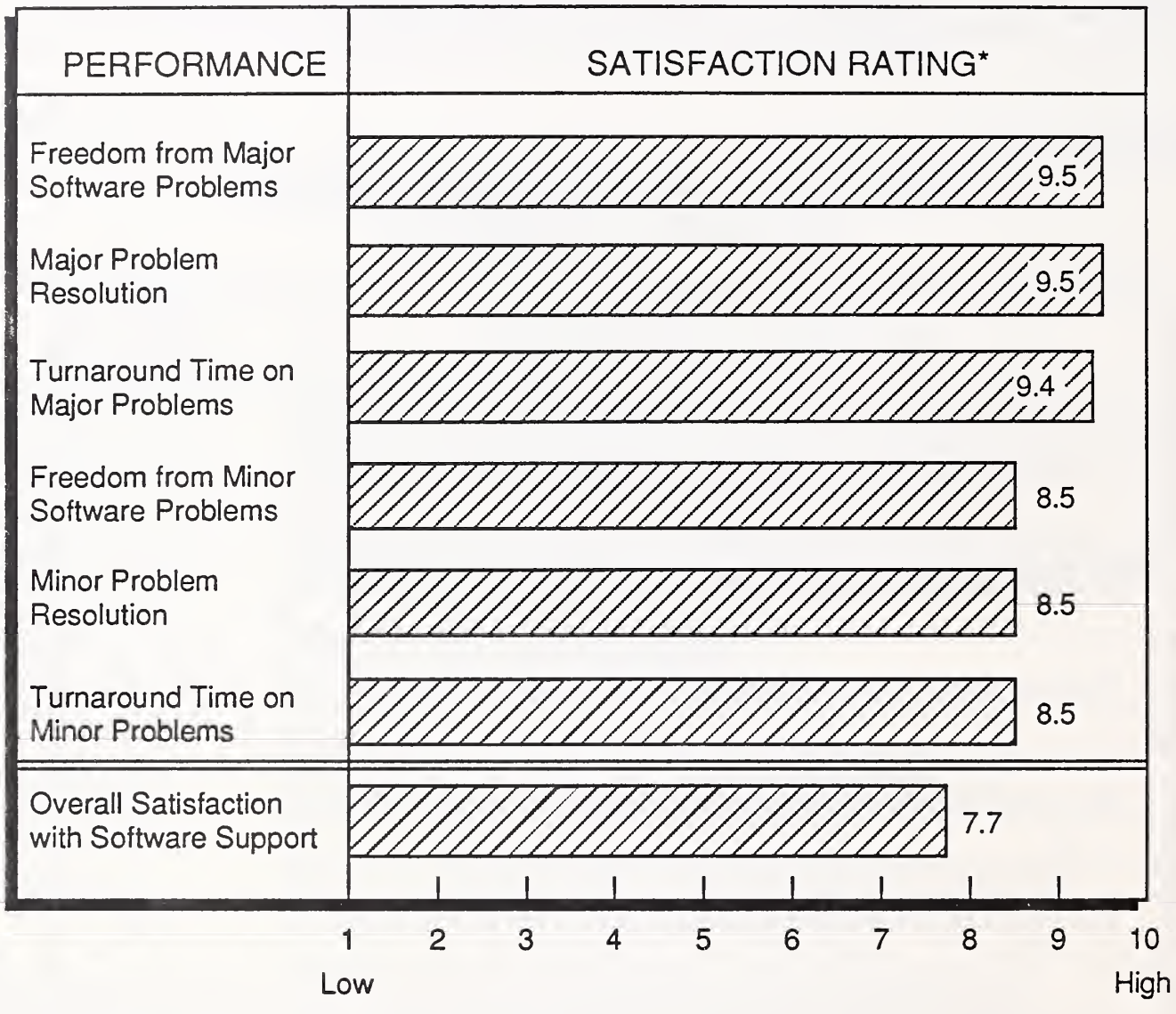
*Insufficient Response

The McCormick & Dodge users were very satisfied with their software and support with regard to major problems, as shown in Exhibit IV-31, rating their satisfaction with the software's freedom from major problems a 9.5 on a scale of 10 and rating both major problem resolution and turnaround time a 9.4.

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EXHIBIT IV-31

USER SATISFACTION WITH SOFTWARE SUPPORT PERFORMANCE McCORMACK & DODGE



*Average Standard Error of the Mean: 0.3

These users were less satisfied with regard to minor problems, and this tended to affect their overall satisfaction with support, which received a rating of only 7.7.

Documentation appears to be a major contributor to any dissatisfaction users have with support, as shown in Exhibits IV-32 through IV-34. Exhibit IV-32 indicates that McCormack & Dodge users place the greatest importance on documentation (valued at a 9.5 on a scale of 10).

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Unfortunately, these users rated M&D performance a 6.0 on the same scale, and, as a result, McCormack & Dodge managed to satisfy only 17% of its users (Exhibit IV- 33).

EXHIBIT IV-32

SOFTWARE SUPPORT VALUE/PERFORMANCE LEVELS McCORMACK & DODGE

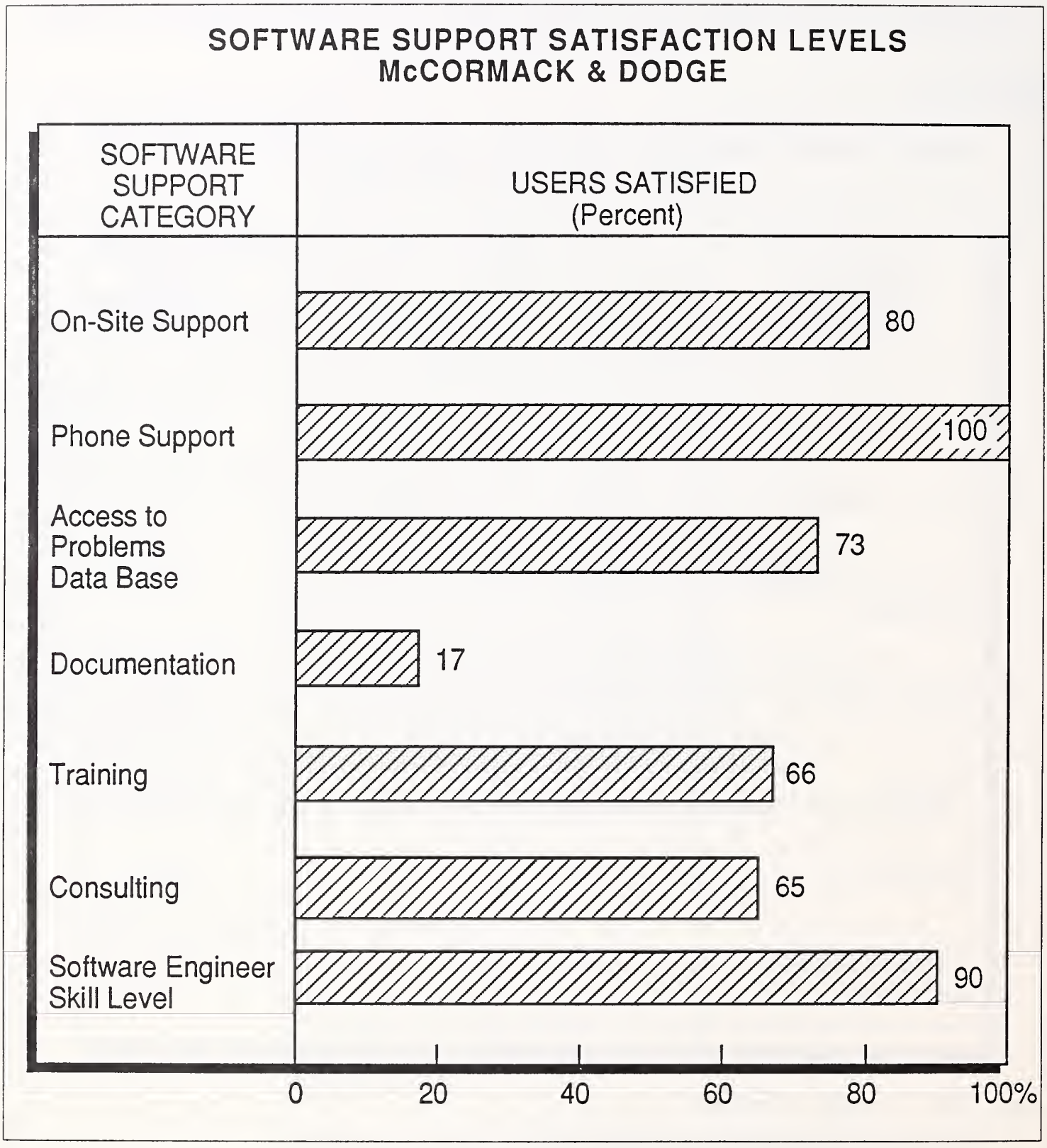
SOFTWARE SUPPORT CATEGORY	LEVEL OF SUPPORT		PERFORMANCE EXCEEDS (FALLS BELOW) USER VALUE
	VALUE	PERFORMANCE	
On-Site Support	5.1	7.7	2.6
Phone Support	6.0	8.7	2.7
Access to Problems Data Base	8.0	7.4	(0.6)
Documentation	9.5	6.0	(3.5)
Training	7.2	6.0	(1.2)
Consulting	7.5	7.1	(0.4)
Software Engineer Skill Level	7.0	7.1	0.1

Scale: 1 = Low, 10 = High

Average Standard Error of the Mean: 0.4

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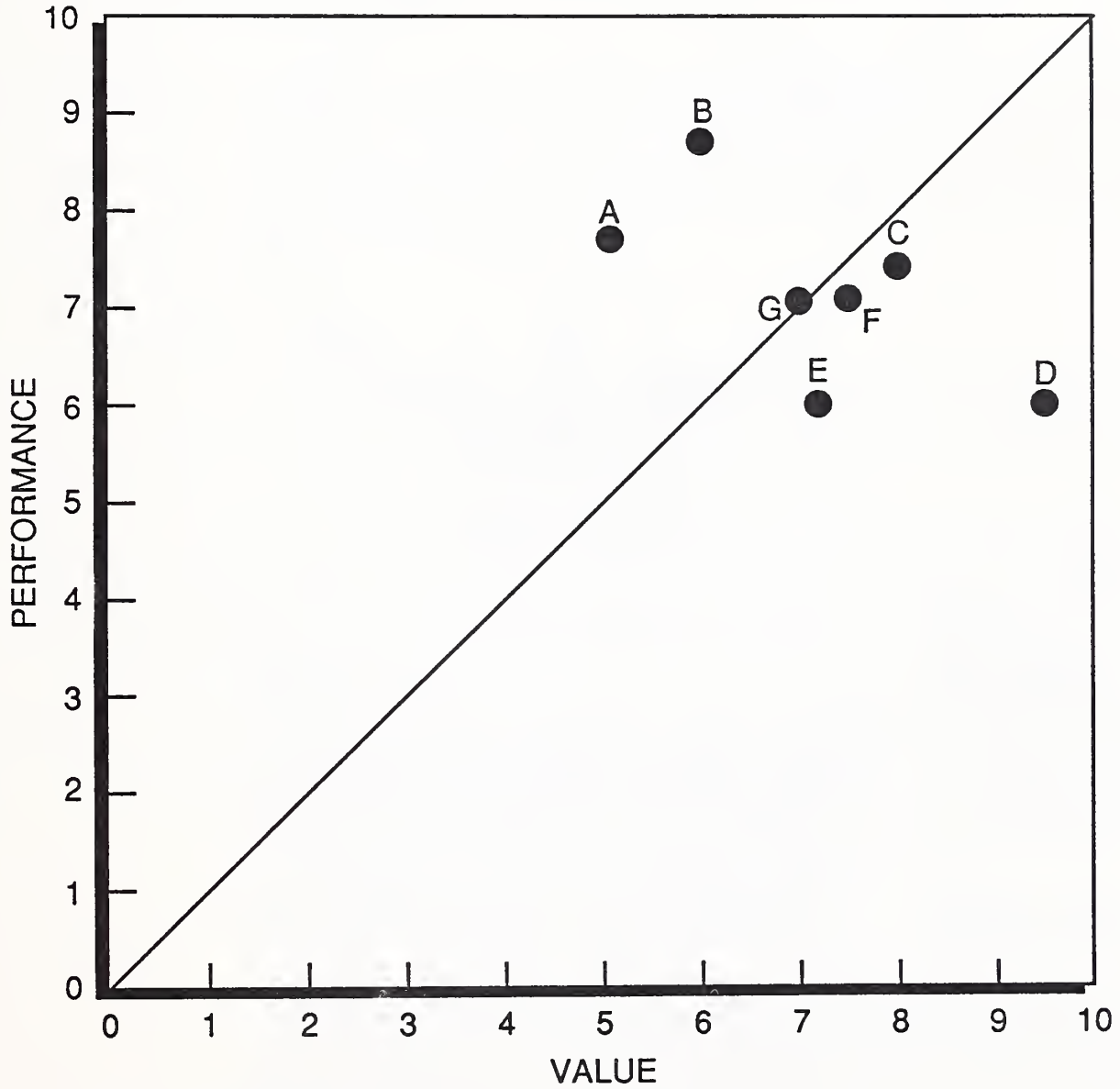
EXHIBIT IV-33



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EXHIBIT IV-34

SOFTWARE SUPPORT VENDOR PERFORMANCE VERSUS USER VALUE McCORMACK & DODGE

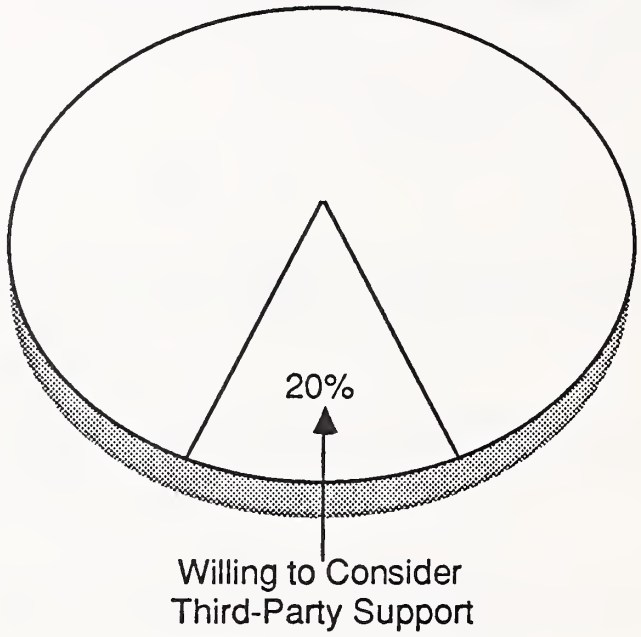


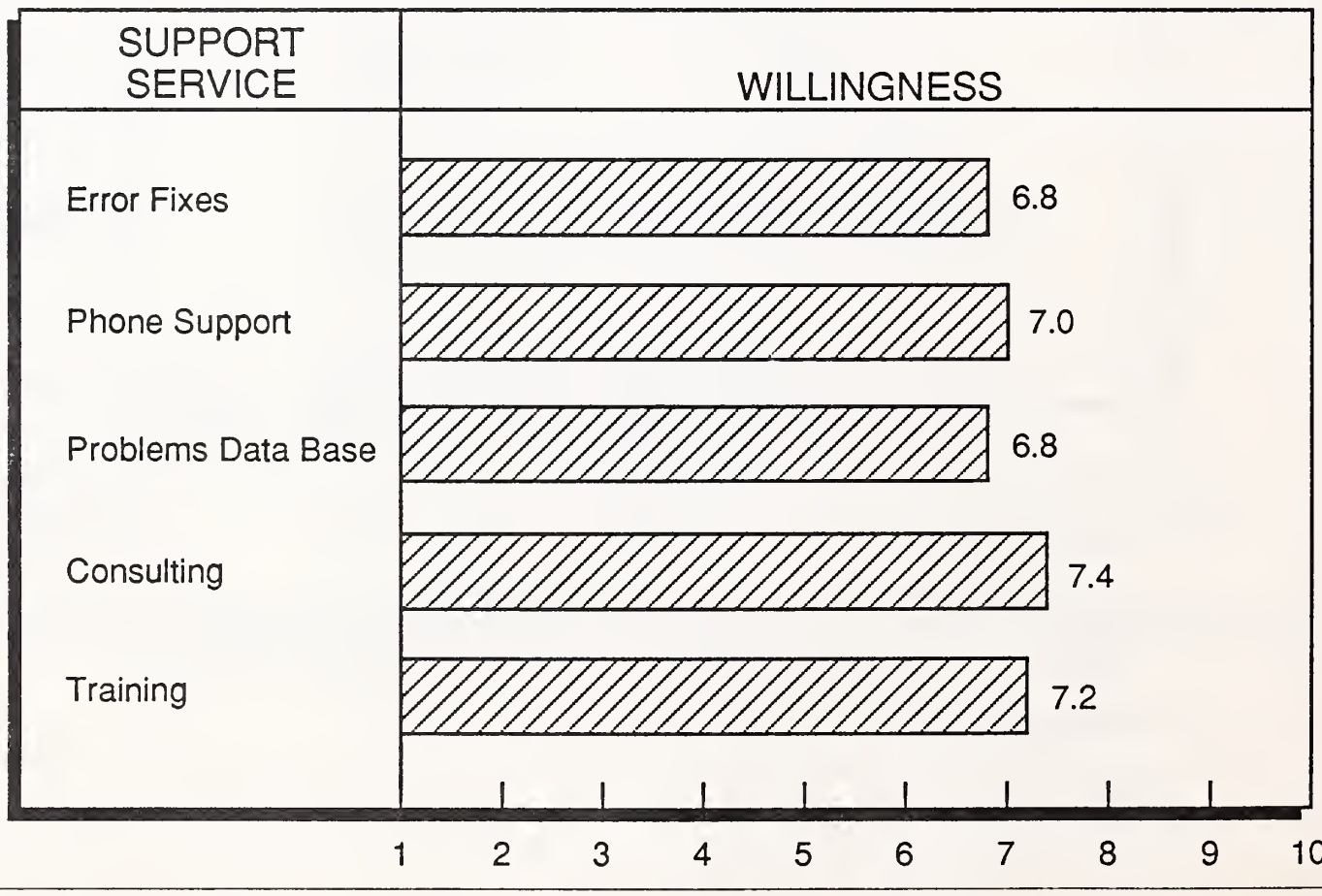
A = On-Site Support
B = Phone Support
C = Access to Problems Data Base
D = Documentation
E = Training
F = Consulting
G = Software Engineer Skill Level

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EXHIBIT IV-35

WILLINGNESS TO CONSIDER THIRD-PARTY SOFTWARE SUPPORT McCORMACK & DODGE





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Beyond documentation, McCormack & Dodge support performance manages to satisfy the majority of its users' needs, although it appears that a small group of extremely dissatisfied users are skewing "performance" ratings in Exhibits IV-32 and IV-34. This accounts for the fact that the majority of users are satisfied with consulting and access to problems data bases even though the users' performance ratings fall short of their value ratings.

Exhibit IV-35 indicates 20% of the McCormack & Dodge users were willing to consider a third-party source of software support. These users rated their willingness to use third-party support in the areas of consulting and training very highly, suggesting a good opportunity for third-party penetration into this market.

F

MSA

In 1987, INPUT surveyed thirty users of Management Science America (MSA) accounting software products that were typically used in some combination by all users in the MSA sample.

The MSA sample typically used IBM mainframes, predominantly IBM 43XXs and 308X/9Xs, although two users used NAS AS mainframes and one used a Honeywell mainframe system.

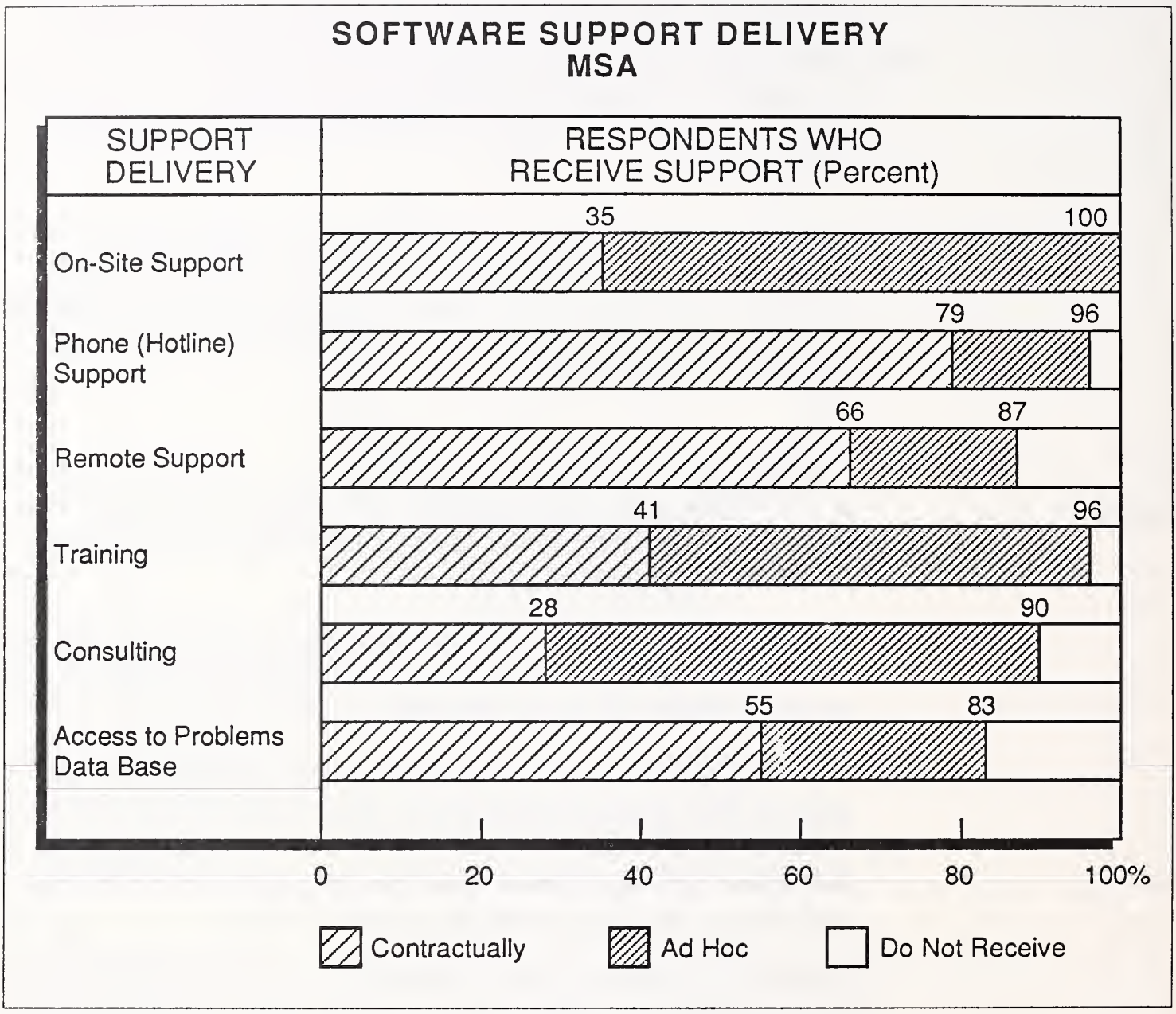
Depending upon the module selected and the features contained in each program, MSA accounting packages can range in price from $25,000 up to $150,000. MSA reports in its Form 10-K that support charges range from 8 to 12% of the license fee; however, our sample reported that they paid between 7 and 30%, averaging 14% of the license.

Exhibit IV-36 presents a picture of MSA support delivery as reported by its users. While MSA makes on-site support available to its end users, it is apparent that most users (79% of the sample) receive their support via the telephone. Users who purchase MSA's ExpertInsight module of ExpertLink program can access a problems data base directly, and 55% of this sample went this route. ExpertLink also provides a facility to remote support, and two-thirds of the sample take advantage of this capability.

MSA stresses its involvement in the area of training, offering users training credits that vary by product. Forty-one percent of the MSA users contract for training, another 55% receive their training via the credits provided with their software purchase.

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EXHIBIT IV-36



MSA software reliability appears to be below average in terms of freedom from major and minor problems, as reported by MSA users in Exhibit IV-37. Major problem resolution is significantly better than the overall sample's responses (14.1 hours versus 20.6 hours); however, minor problem resolution time is only slightly better than the entire sample's.

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EXHIBIT IV-37

SOFTWARE SUPPORT PERFORMANCE
MSA

SUPPORT COMPONENT	
Number of Major Problems Reported per Month	0.9
Number of Major Problems Resolved per Month	0.9
Turnaround Time of Major Problems (Hours)	14.1
Number of Minor Problems Reported per Month	2.2
Number of Minor Problems Resolved per Month	2.2
Turnaround Time of Minor Problems (Hours)	24.3

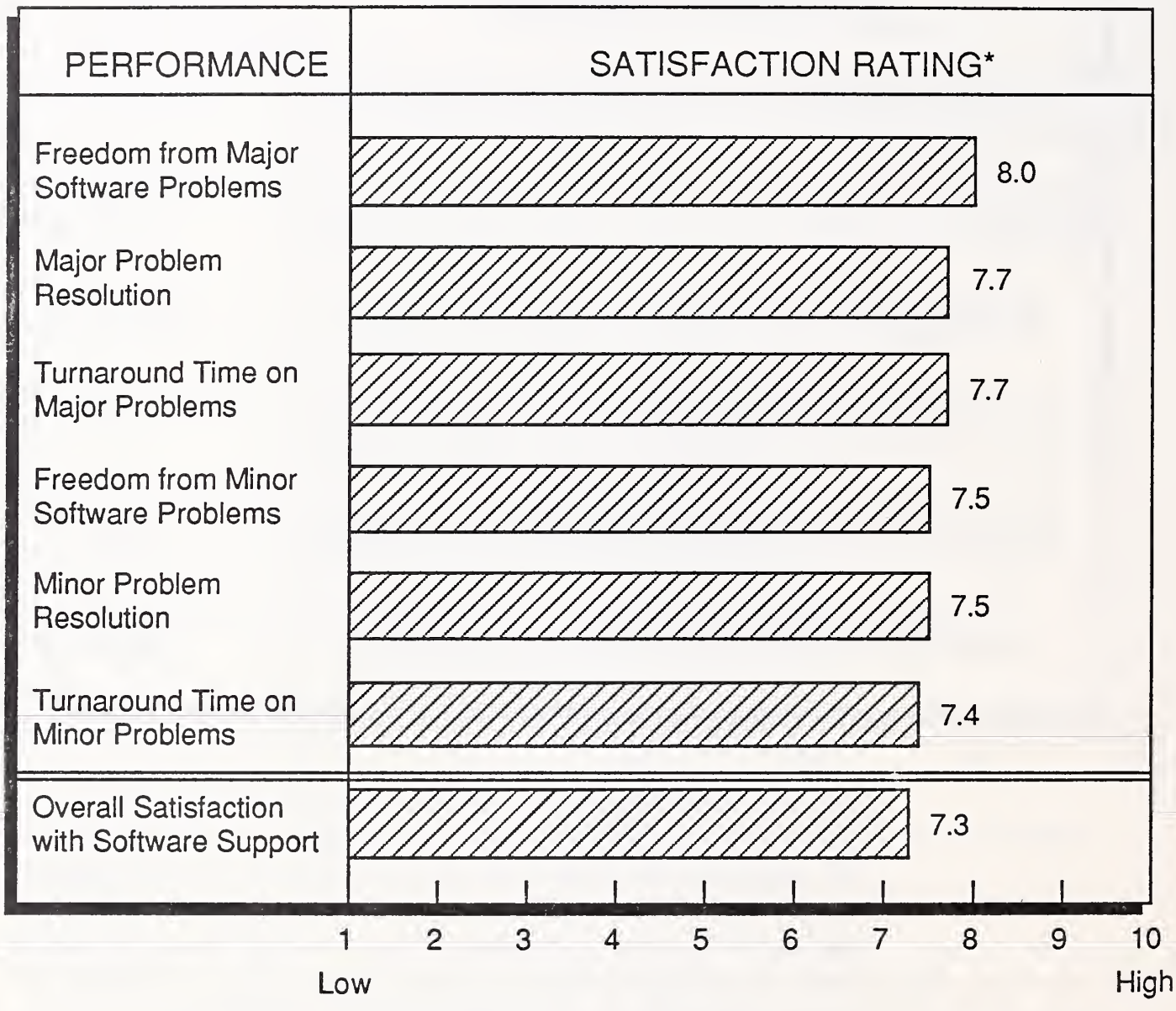
The MSA users rated their satisfaction with each of these software support criteria significantly lower than the entire sample (see Exhibit IV-38), suggesting that MSA users are expecting more from their support vendor. Upon closer examination of performance and value levels in Exhibit IV-39, it can be seen that MSA users relatively are pleased with certain aspects of their support, namely on-site support, problems data bases, and training services received, yet concerned with areas most valuable to them:

- Documentation, valued at a 9.0 (on a scale of 10), rated only a 7.3 in performance received (shown in Exhibit IV-39).
- Software engineer skill level, valued a 9.3, rated a 7.2 in performance received.

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EXHIBIT IV-38

USER SATISFACTION WITH SOFTWARE SUPPORT PERFORMANCE MSA



*Average Standard Error of the Mean: 0.3

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EXHIBIT IV-39

SOFTWARE SUPPORT VALUE/PERFORMANCE LEVELS MSA

SOFTWARE SUPPORT CATEGORY	LEVEL OF SUPPORT		PERFORMANCE EXCEEDS (FALLS BELOW) USER VALUE
	VALUE	PERFORMANCE	
On-Site Support	6.5	6.8	0.3
Phone Support	8.0	7.8	(0.2)
Access to Problems Data Base	7.6	7.5	(0.1)
Documentation	9.0	7.3	(1.7)
Training	8.6	7.9	(0.7)
Consulting	*	*	-
Software Engineer Skill Level	9.3	7.2	(2.1)

Scale: 1 = Low, 10 = High

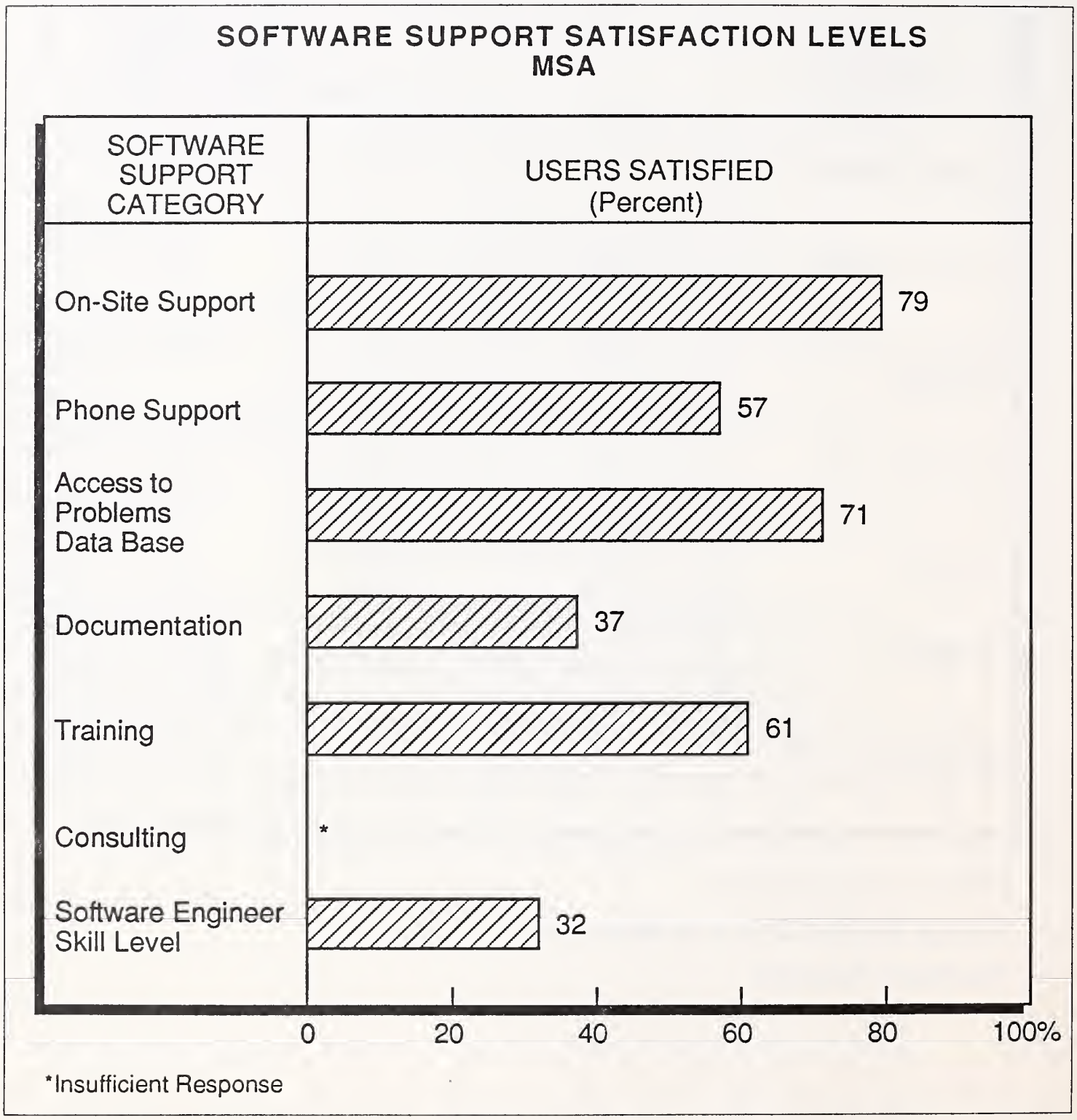
Average Standard Error of the Mean: 0.4

*Insufficient Response

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Exhibit IV-40 indicates that MSA users are least satisfied with these valued services as MSA manages to satisfy only 37% of its users' documentation needs and 32% of the users' requirements regarding the software engineer's skill level.

EXHIBIT IV-40



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The MSA users criticized the documentation's clarity and reported that their documentation was frequently out-of-date. The users also stated that response time was a problem.

Exhibit IV-41 graphically presents the discrepancy between user-perceived value of these services versus reported service performance. MSA should be particularly concerned about user dissatisfaction with documentation, which was also the biggest problem in the 1986 MSA performance analysis.

This building dissatisfaction may cause some users to look to other sources of software support. Exhibit IV-42 indicates that 43% of the MSA users are willing to consider a third-party source of software support, particularly in the areas of consulting and training. This willingness is the largest of all products analyzed.

G

NCA

NCA is a leading vendor of integrated software packages that combine manufacturing and financial functions in powerful applications systems for DEC VAX/VMS computer systems.

NCA MAXCIM Financial System is composed of a number of accounting modules, including order management, general ledger, accounts payable and receivable, and fixed assets, to name a few. Depending on the number of modules selected, the price of this software ranges between $30,000 and $128,000.

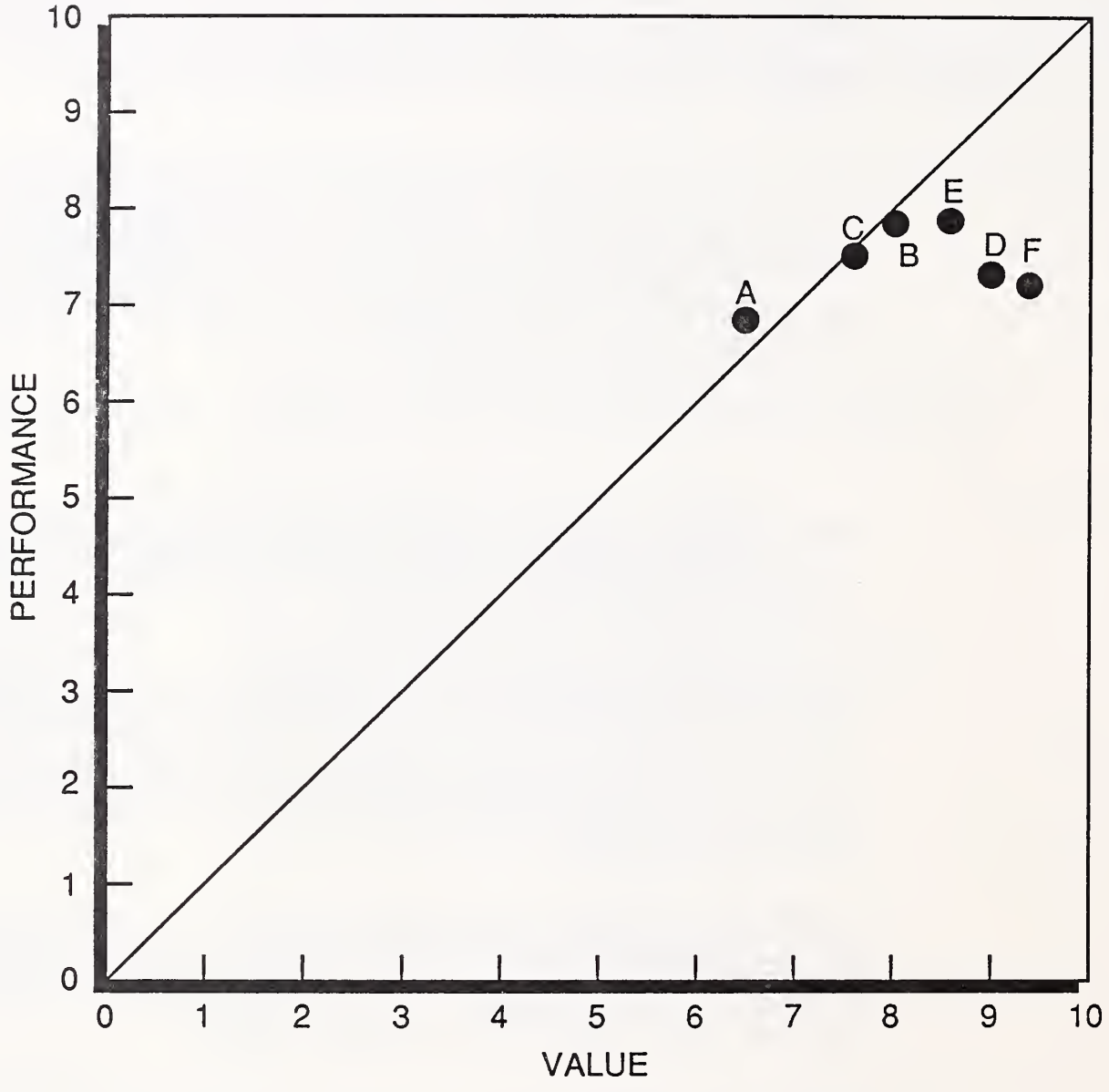
NCA MAXCIM Manufacturing System combines a number of manufacturing control and accounting functions, including purchasing, capacity planning, inventory, and payroll. This package costs $50,000-$100,000 (one-time license), depending on modules selected.

NCA charges 12% per year for support, although some users must have negotiated for different levels of support since the responses ranged from 10-15%.

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EXHIBIT IV-41

SOFTWARE SUPPORT VENDOR PERFORMANCE VERSUS USER VALUE MSA

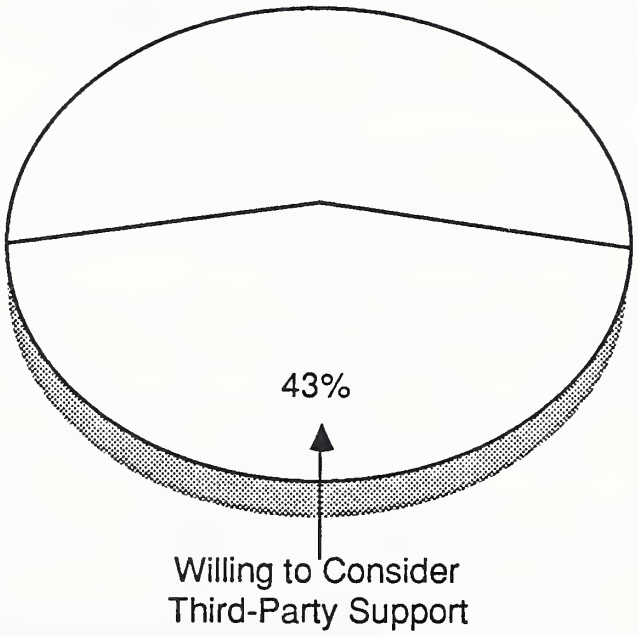


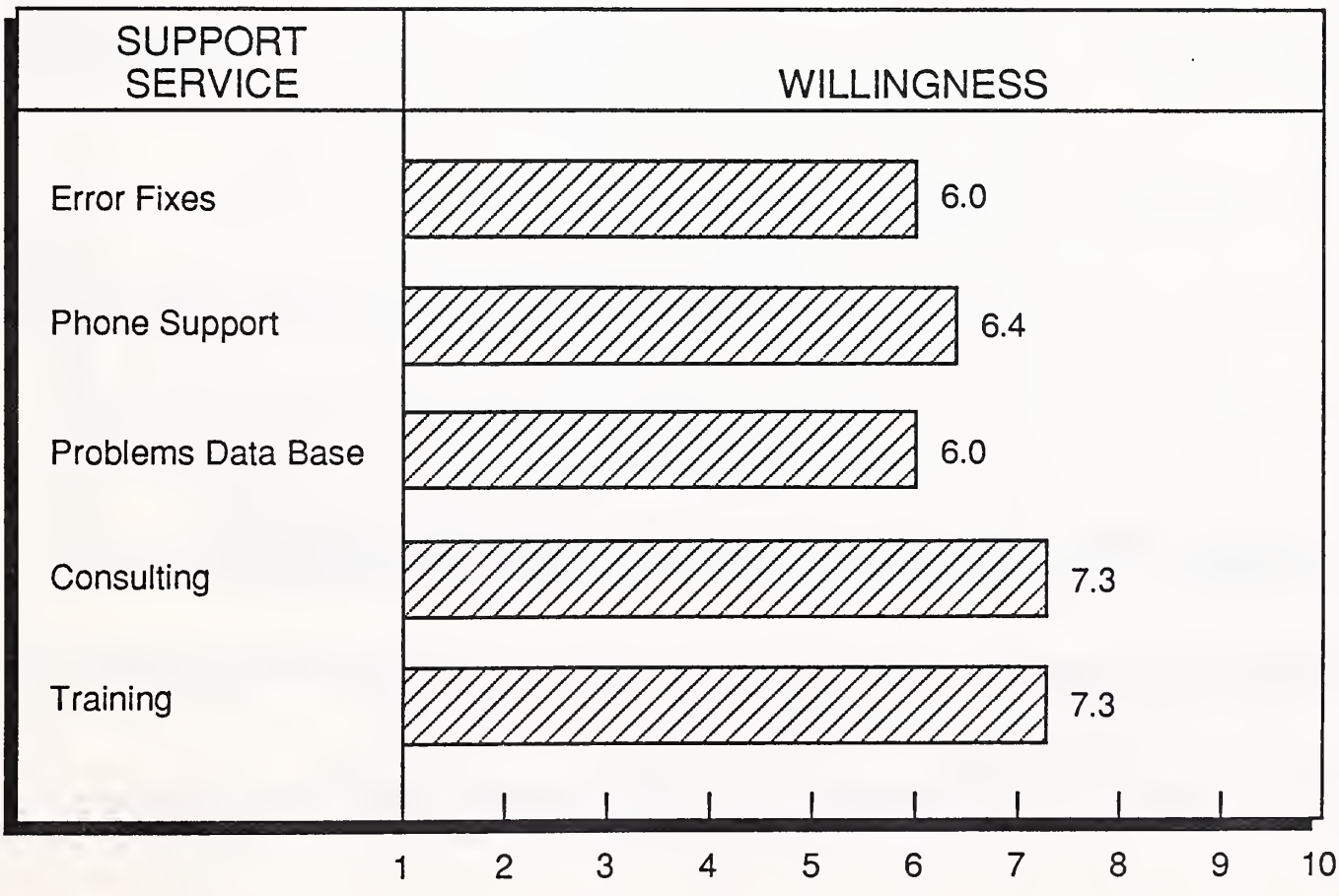
A = On-Site Support
B = Phone Support
C = Access to Problems Data Base
D = Documentation
E = Training
F = Software Engineer Skill Level

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EXHIBIT IV-42

WILLINGNESS TO CONSIDER THIRD-PARTY SOFTWARE SUPPORT MSA





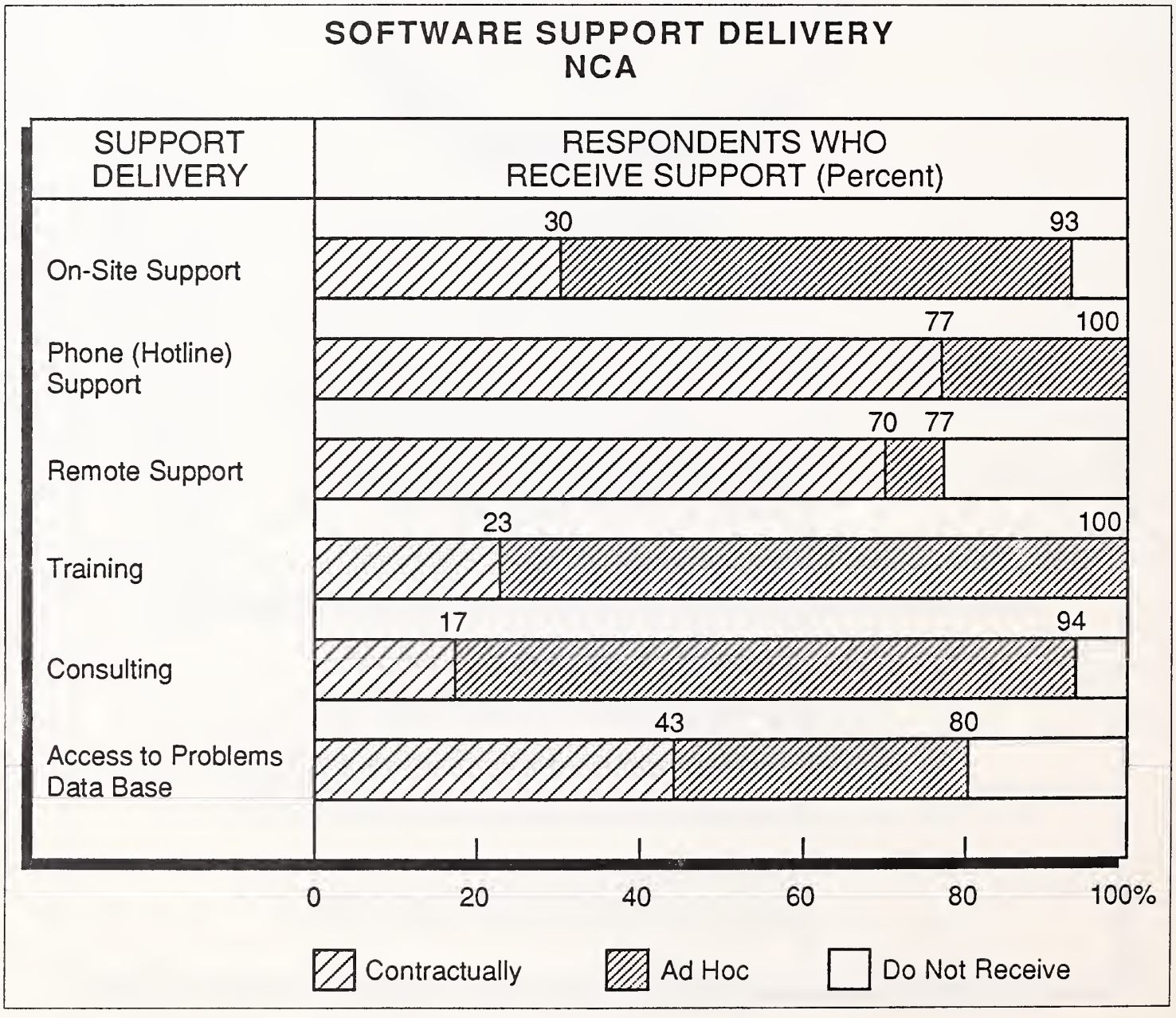
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Exhibit IV-43 indicates that the vast majority of NCA users opt for telephone support, supplemented (at newer installations) by remote support (down-line loading of fixes). NCA has only recently begun offering remote support, hoping to improve support responsiveness and efficiency while at the same time (eventually) reducing support costs.

Thirty percent of the sample also opted for on-site support contracts, which are typically billed on a hourly basis.

Few users opted for additional training (23% of the sample) and consulting (17%), with most users relying on the initial or other ad hoc support that they receive in these areas.

EXHIBIT IV-43



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Exhibit IV-44 shows that NCA users reported that its software suffers in its freedom from both major problems (at 1.4 per month) and minor problems (2.0 per month), both areas falling behind industry-wide performance shown in Chapter III. Furthermore, the users reported that some major problems do not even get resolved (1.4 problems reported versus 1.2 resolved). This discrepancy may be attributed to the move towards remote support, since some fixes to problems observed by users and resolved remotely may not always be perceived by the user. This can be avoided by providing an up-to-date log of all remote support activities.

EXHIBIT IV-44

SOFTWARE SUPPORT PERFORMANCE
NCA

SUPPORT COMPONENT	
Number of Major Problems Reported per Month	1.4
Number of Major Problems Resolved per Month	1.2
Turnaround Time of Major Problems (Hours)	29.2
Number of Minor Problems Reported per Month	2.0
Number of Minor Problems Resolved per Month	2.0
Turnaround Time of Minor Problems (Hours)	14.0

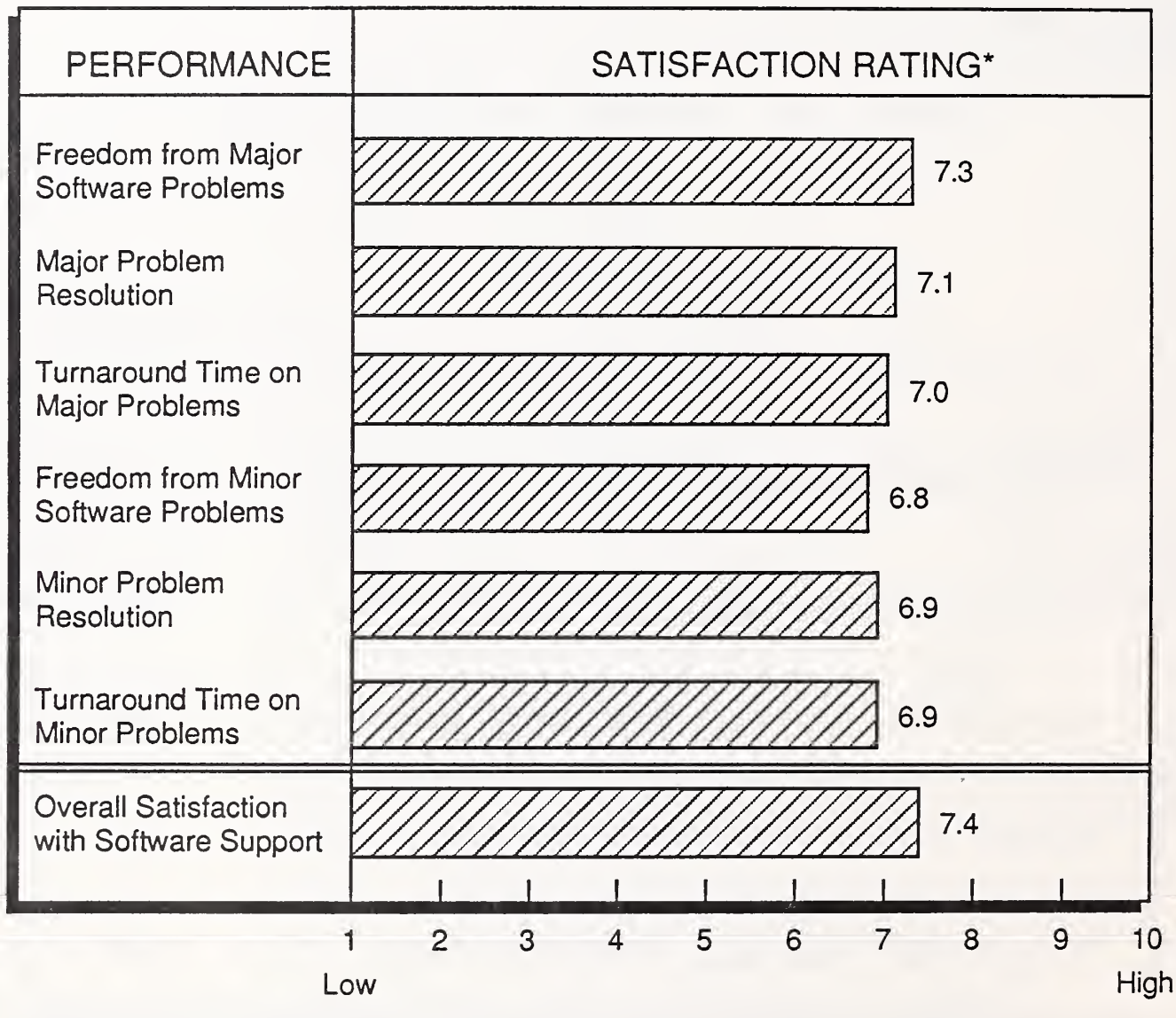
Turnaround time for major problems is an even greater problem, averaging almost thirty hours compared to twenty-one hours for the entire software sample. This seems excessively high, considering the move to remote support. NCA performance is much better for minor problems, which required fourteen-hour turnaround.

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Exhibit IV-45 reflects lower than average user satisfaction with NCA reliability and support responsiveness, with user ratings ranging between 6.8 and 7.4 (on a scale of 10), versus overall sample ratings between 8.2 and 8.9.

EXHIBIT IV-45

USER SATISFACTION WITH SOFTWARE SUPPORT PERFORMANCE NCA



*Average Standard Error of the Mean: 0.3

NCA users place the greatest importance on the support organization's software engineer skill level (valued as a 8.0 on a scale of 10) and the documentation (valued as a 7.8). Unfortunately, NCA performance is rated (in Exhibit IV-46) significantly lower in these two areas, 7.0 and 6.4, respectively.

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EXHIBIT IV-46

SOFTWARE SUPPORT VALUE/PERFORMANCE LEVELS NCA

SOFTWARE SUPPORT CATEGORY	LEVEL OF SUPPORT		PERFORMANCE EXCEEDS (FALLS BELOW) USER VALUE
	VALUE	PERFORMANCE	
On-Site Support	4.4	5.3	0.9
Phone Support	7.2	7.1	(0.1)
Access to Problems Data Base	6.3	5.5	(0.8)
Documentation	7.8	6.4	(1.4)
Training	5.9	5.2	(0.7)
Consulting	5.0	5.8	0.8
Software Engineer Skill Level	8.0	7.0	(1.0)

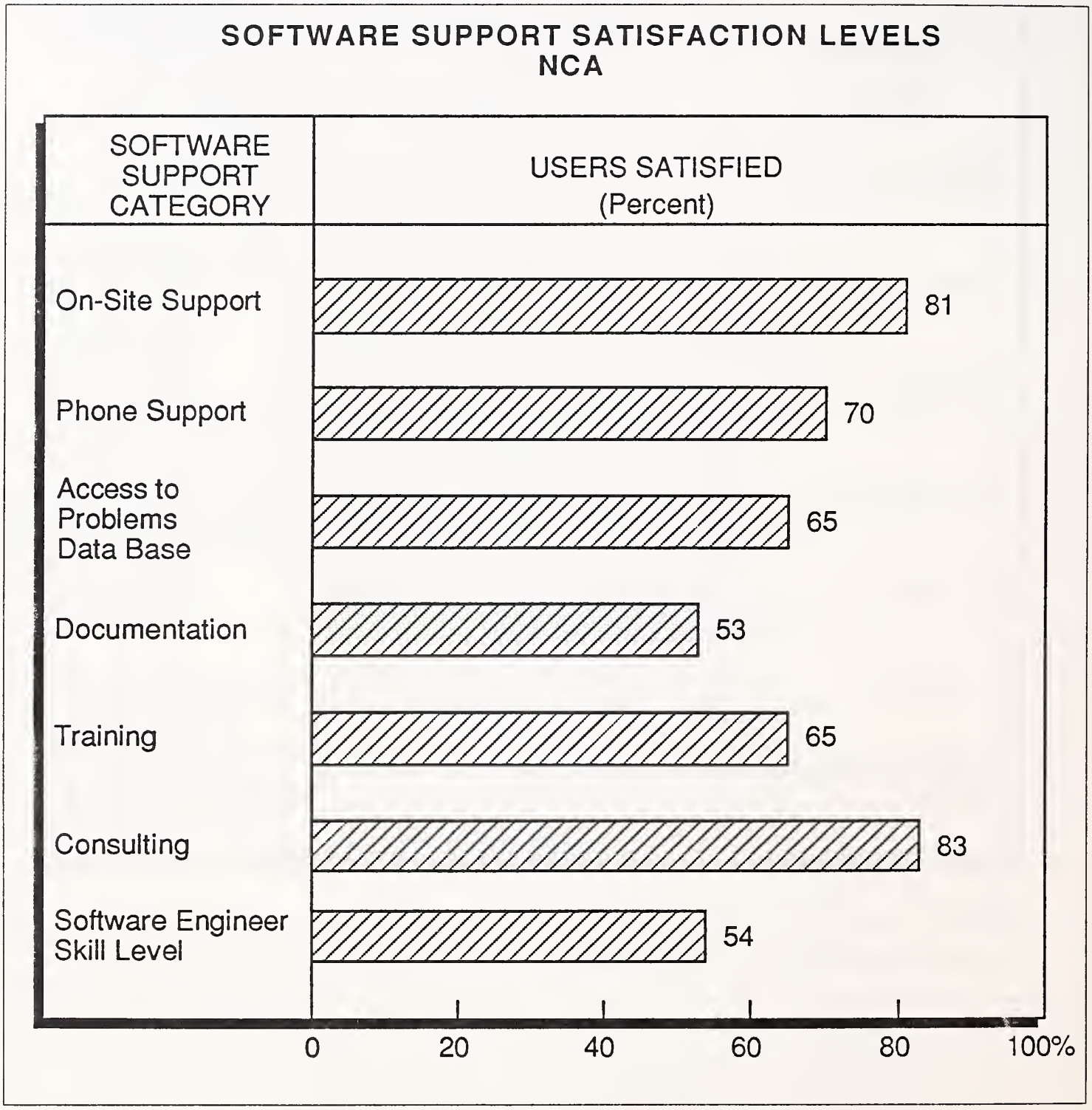
Scale: 1 = Low, 10 = High

Average Standard Error of the Mean: 0.5

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These lower performance ratings may be partly caused by a small group of extremely displeased users whose responses may have skewed the averages, but Exhibit IV-47 shows that NCA still only satisfies less than 55% of its users in its two important areas.

EXHIBIT IV-47



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When asked what single improvement users desired most, six users pointed to the number of skilled support personnel available. Specific responses included:

- "Be more definite on support decisions."
- "Better knowledge of the bugs."
- "Raise the level of technical support."

Five users specified documentation improvements as the most important improvement desired.

Exhibit IV-48 graphically illustrates the gap between user-perceived value and vendor performance in these areas.

Not surprisingly, a relatively large percentage of the NCA users were willing to consider a third-party source of support. Exhibit IV-49 shows that 30% of the NCA sample would consider an alternative source of support, particularly an alternative source of phone support.

H

Pansophic

In 1987, INPUT surveyed thirty users of Pansophic Systems software products, including thirteen users of Easytrieve, a database file management system; ten users of Panvalet, a library management system; four users of Gener/OL, an application development tool; and three users of O-W-L, a programming utility.

Pansophic prices its software as follows: Panvalet, $10,000- $22,000; O-W-L, $20,000-$27,000; Easytrieve, $21,000-$27,000; and Gener/OL, $35,000-$40,000. Pansophic users reported that they paid 15% of the software license fee per year for support.

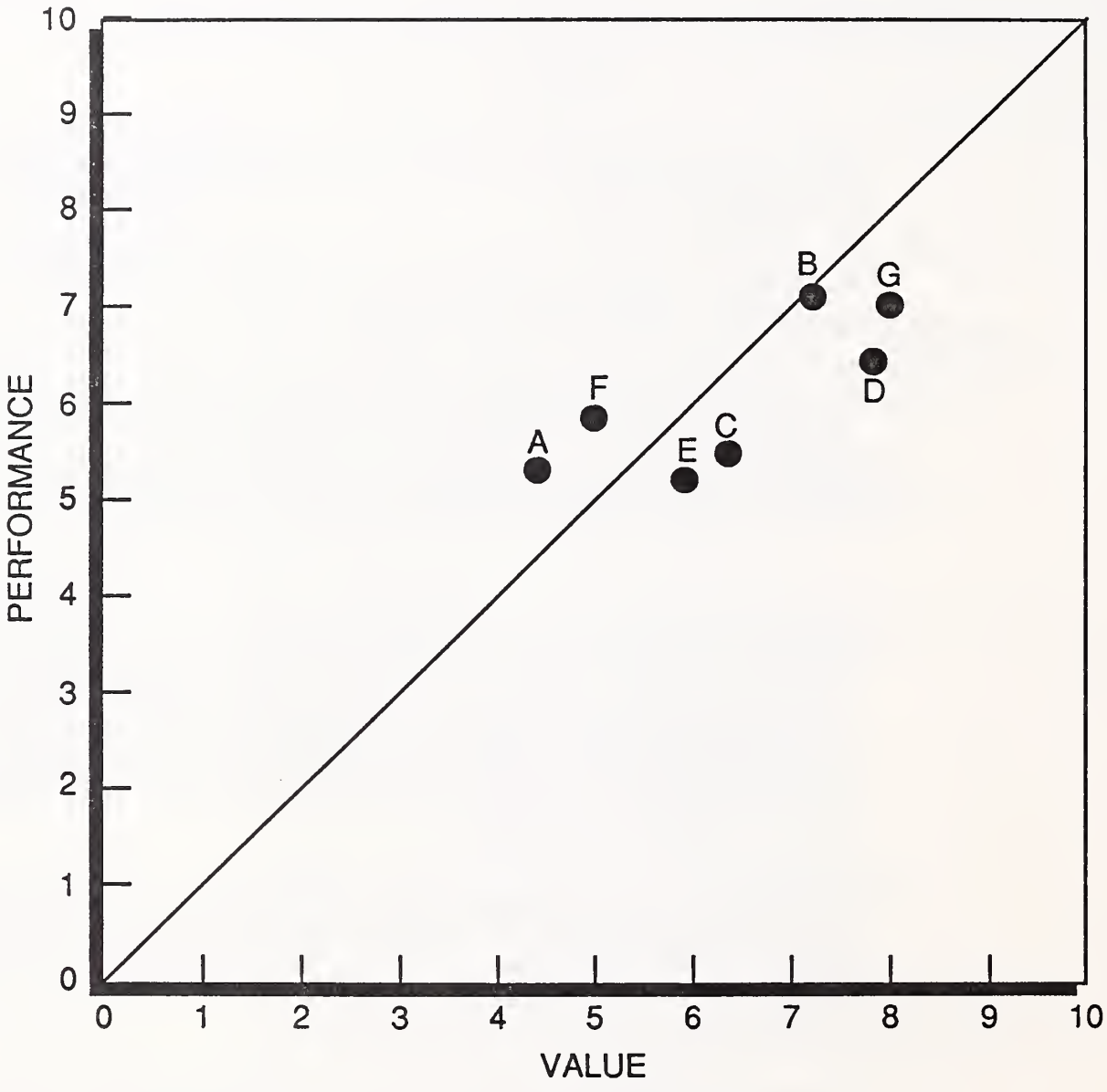
Exhibit IV-50 shows that the majority of contractual software support is delivered by telephone, although 40% of the users reported that they receive on-site support as a part of their contract.

In 1986, Pansophic stated a desire to increase its involvement in remote support technology, and, in 1987, 45% of its sample reported receiving this service contractually; another 25% received it on an ad hoc basis.

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EXHIBIT IV-48

SOFTWARE SUPPORT VENDOR PERFORMANCE VERSUS USER VALUE NCA

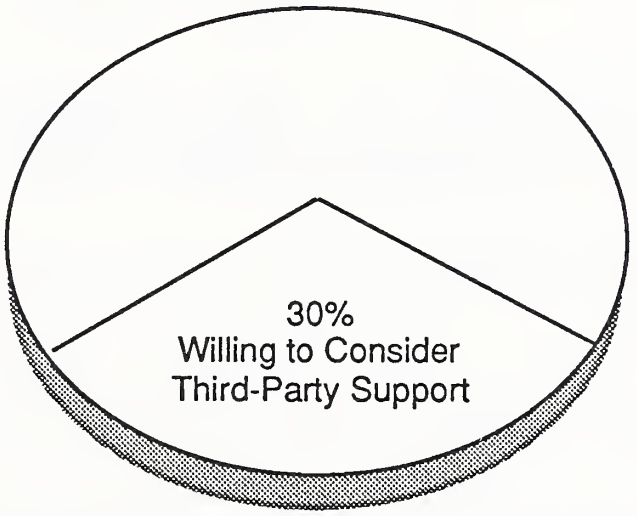


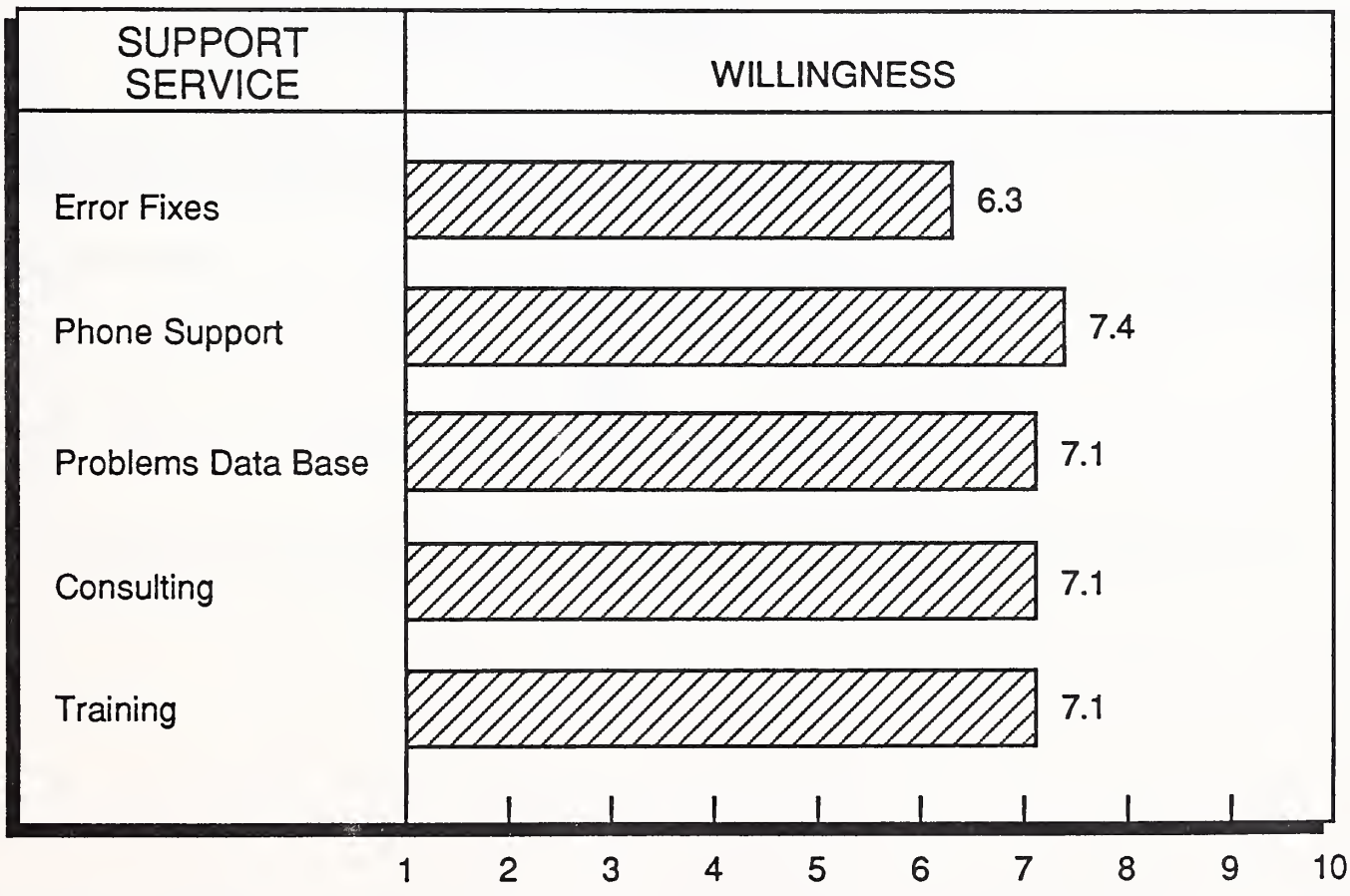
A = On-Site Support
B = Phone Support
C = Access to Problems Data Base
D = Documentation
E = Training
F = Consulting
G = Software Engineer Skill Level

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EXHIBIT IV-49

WILLINGNESS TO CONSIDER THIRD-PARTY SOFTWARE SUPPORT NCA

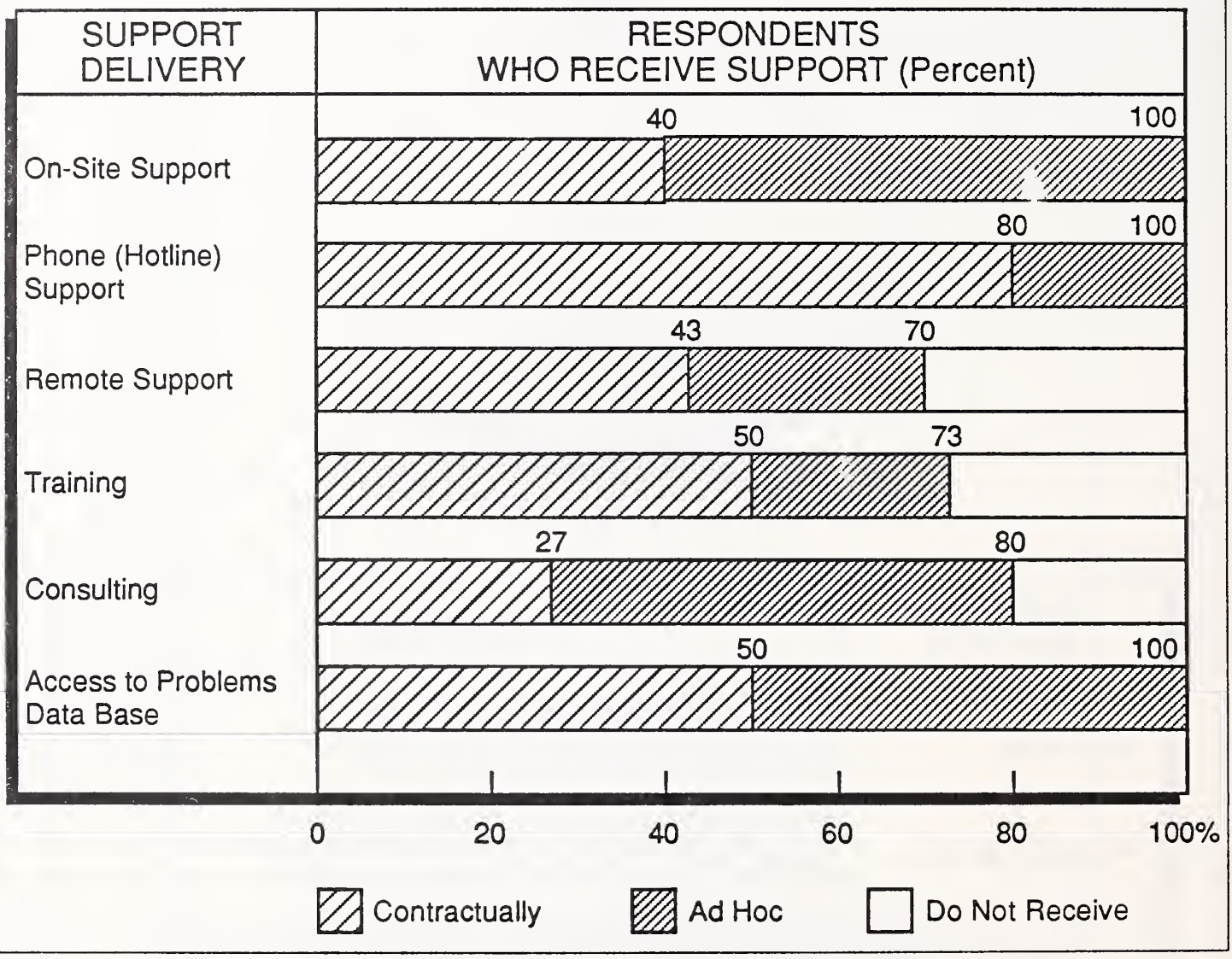




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EXHIBIT IV-50

SOFTWARE SUPPORT DELIVERY
PANSOPHIC



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The Pansophic sample reported in Exhibit IV-51 that their software rarely suffered any major or minor problems, averaging only one problem every ten months. As a result, it was impossible to get a valid turnaround time. Exhibit IV-52 demonstrates that Pansophic users are extremely pleased with their software, both in its ability to avoid major and minor problems and in Pansophic's support performance in the event of a problem.

EXHIBIT IV-51

SOFTWARE SUPPORT PERFORMANCE
PANSOPHIC

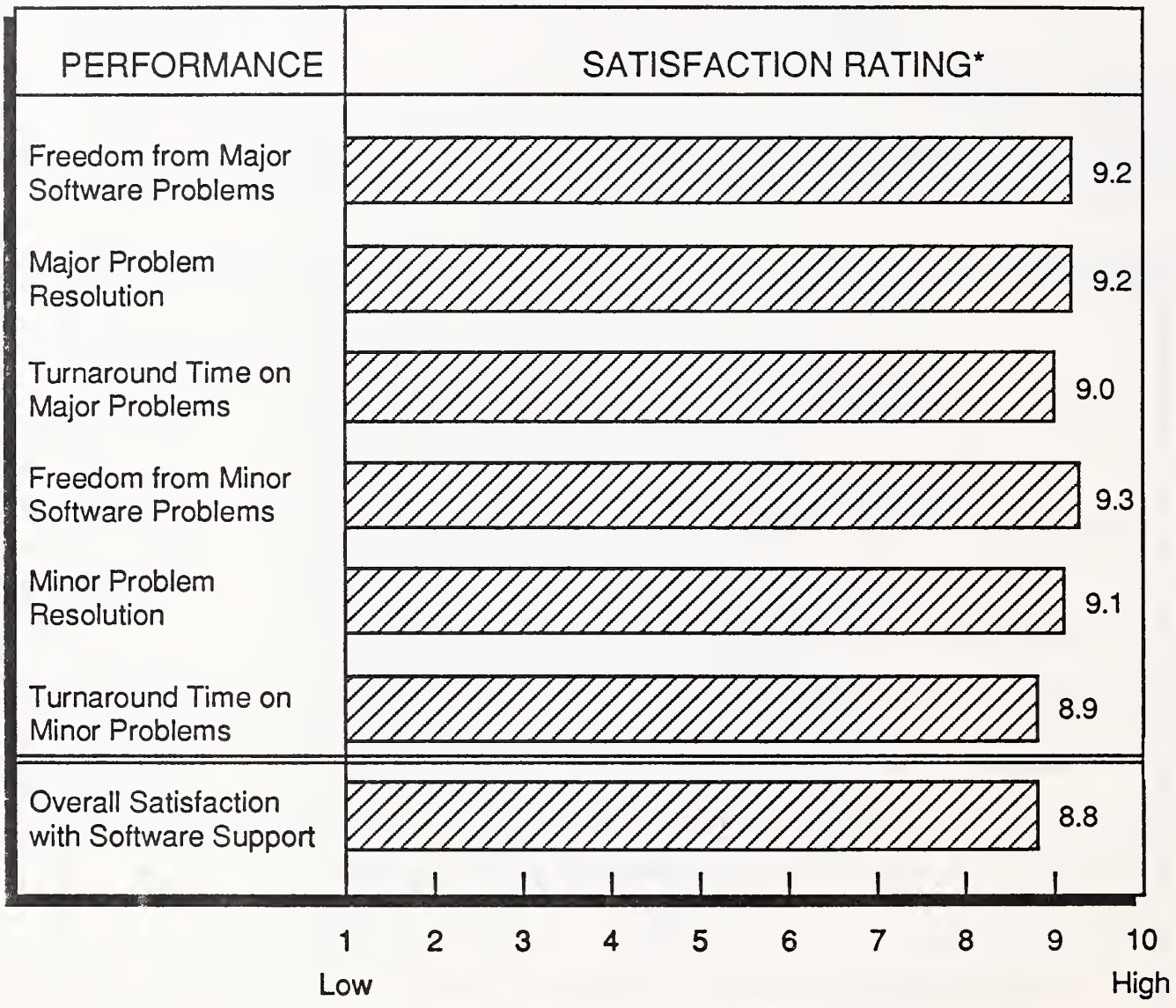
SUPPORT COMPONENT	
Number of Major Problems Reported per Month	0.1
Number of Major Problems Resolved per Month	0.1
Turnaround Time of Major Problems (Hours)	*
Number of Minor Problems Reported per Month	0.1
Number of Minor Problems Resolved per Month	0.1
Turnaround Time of Minor Problems (Hours)	*

*Insufficient Response

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EXHIBIT IV-52

USER SATISFACTION WITH SOFTWARE SUPPORT PERFORMANCE PANSOPHIC



*Average Standard Error of the Mean: 0.4

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The reliability of the software has apparently reduced the value of support in the eyes of Pansophic users; Exhibit IV-53 shows that Pansophic users place a high value on only one support area–documentation.

EXHIBIT IV-53

SOFTWARE SUPPORT VALUE/PERFORMANCE LEVELS PANSOPHIC

SOFTWARE SUPPORT CATEGORY	LEVEL OF SUPPORT		PERFORMANCE EXCEEDS (FALLS BELOW) USER VALUE
	VALUE	PERFORMANCE	
On-Site Support	4.4	6.5	2.1
Phone Support	6.8	8.6	1.8
Access to Problems Data Base	6.0	6.0	-
Documentation	8.6	7.3	(1.3)
Training	7.5	6.0	(1.5)
Consulting	7.2	6.0	(1.2)
Software Engineer Skill Level	7.4	8.1	0.7

Scale: 1 = Low, 10 = High

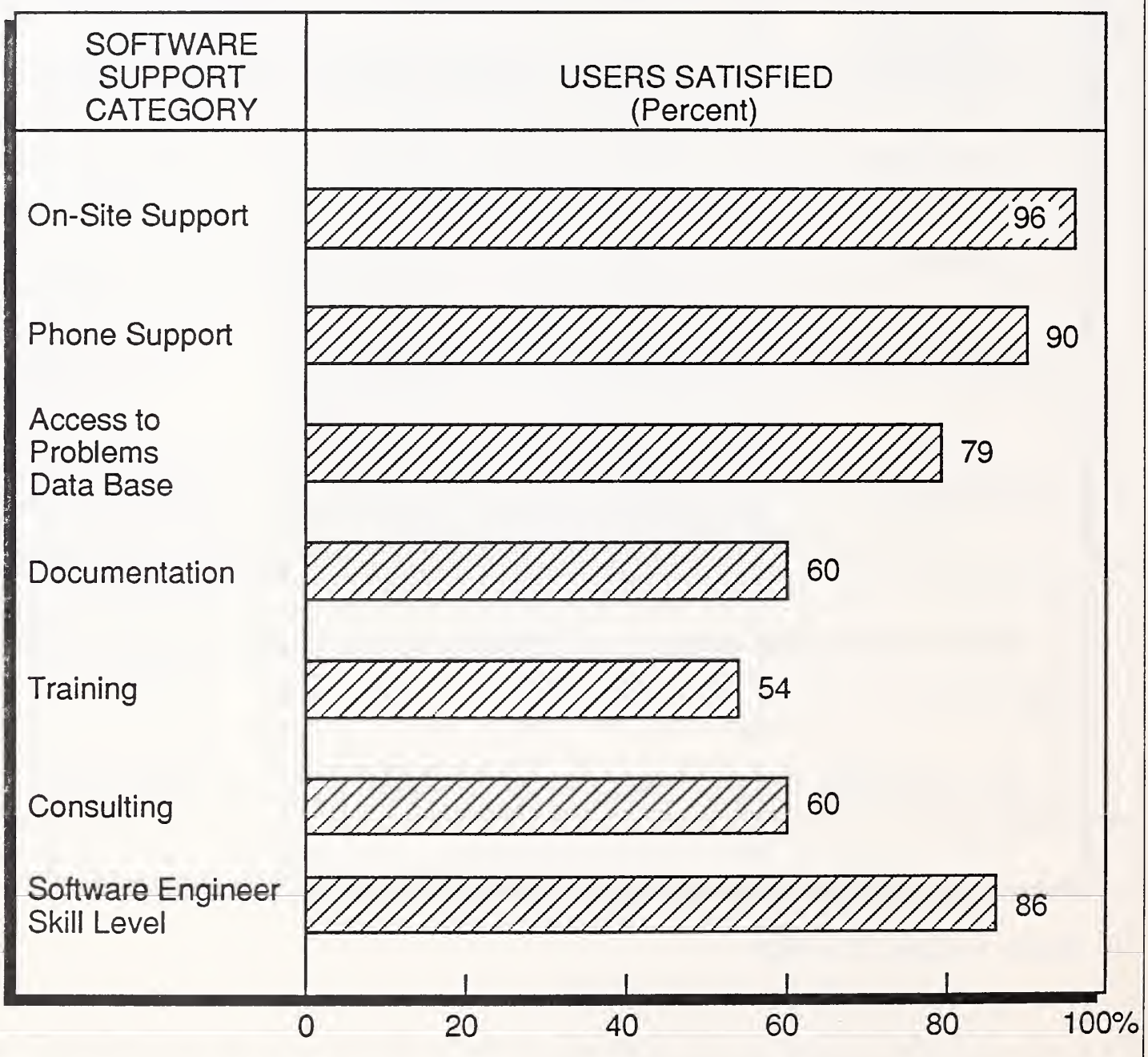
Average Standard Error of the Mean: 0.5

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Since Pansophic users do not place a premium on support (one may argue that its software rarely requires support), it is fairly easy for Pansophic to meet the needs of its users. Exhibit IV-54 indicates that a large percentage of Pansophic users are satisfied with their support, the lowest percentage of user satisfaction being for training (54% satisfied).

EXHIBIT IV-54

SOFTWARE SUPPORT SATISFACTION LEVELS
PANSOPHIC



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Nine users stated that they were very pleased and offered no suggestion for improvements. Two users desired better documentation, and one user mentioned that the turnaround time could be improved.

Still, user satisfaction was extremely high, particularly in the areas of software engineer skill level (86% satisfied) and phone support (90% satisfied). Pansophic received even higher marks in other support areas, such as on-site support. Of course, user requirements for these services are lower (as shown in Exhibit IV- 55), making it easier to satisfy the users' needs.

Not surprisingly, few Pansophic users indicated that they would be willing to consider an alternative source of support, as shown in Exhibit IV-56.

I

Sterling Software

Sterling Software is really a collective of six different operating groups (the Systems Software Group, the Federal Systems Group, the Professional Services Group, the Information Systems Group, the Financial Software Group, and the Business Management Group) that act as wholly- owned subsidiaries. Since all of Sterling's software efforts resulted from acquisition, Sterling allows each operating group to set support policies as they see best.

In 1987, INPUT surveyed users of three Sterling packages out of the Systems Software Group, broken down as follows: Twenty-three users of DMS/OS, a DASD management system, and eight users of TRACS and SUPERTRACS teleprocessing remote access control systems.

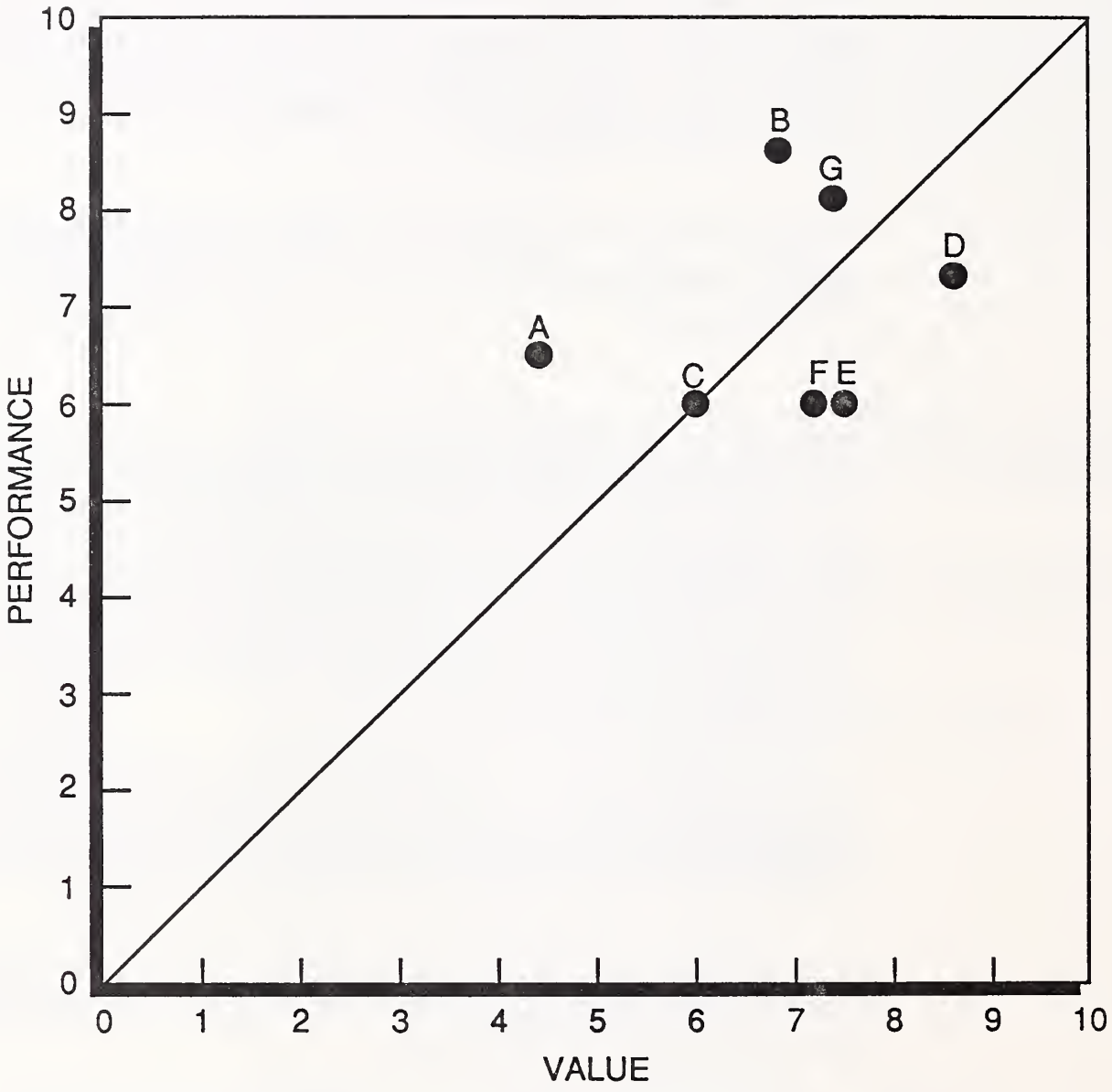
These products were designed to run on IBM mainframe-type products and the sample reflects this: thirteen IBM 30XX users, ten IBM 43XX users, and one NAS AS/8XXX user.

The Sterling software analyzed in this report is priced as follows: DMS/OS, $14,000; TRACS, $7,000-$9,000; and SUPERTRACS, $12,000-$15,000. The Sterling users reported that they paid 12.7% per year on support.

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EXHIBIT IV-55

SOFTWARE SUPPORT VENDOR PERFORMANCE VERSUS USER VALUE PANSOPHIC

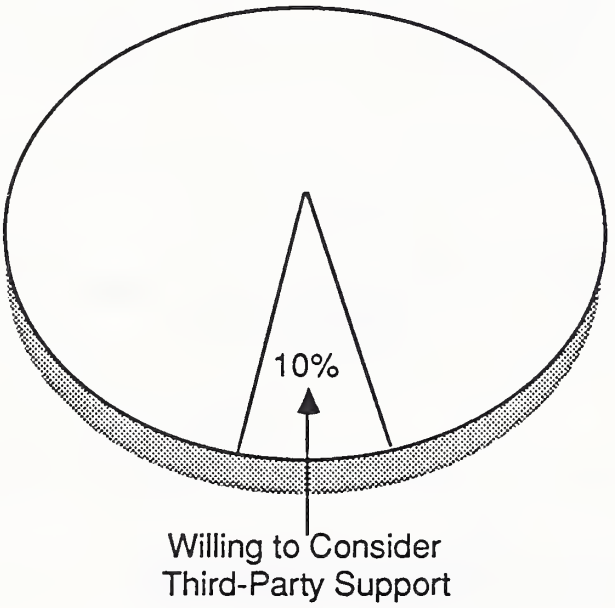


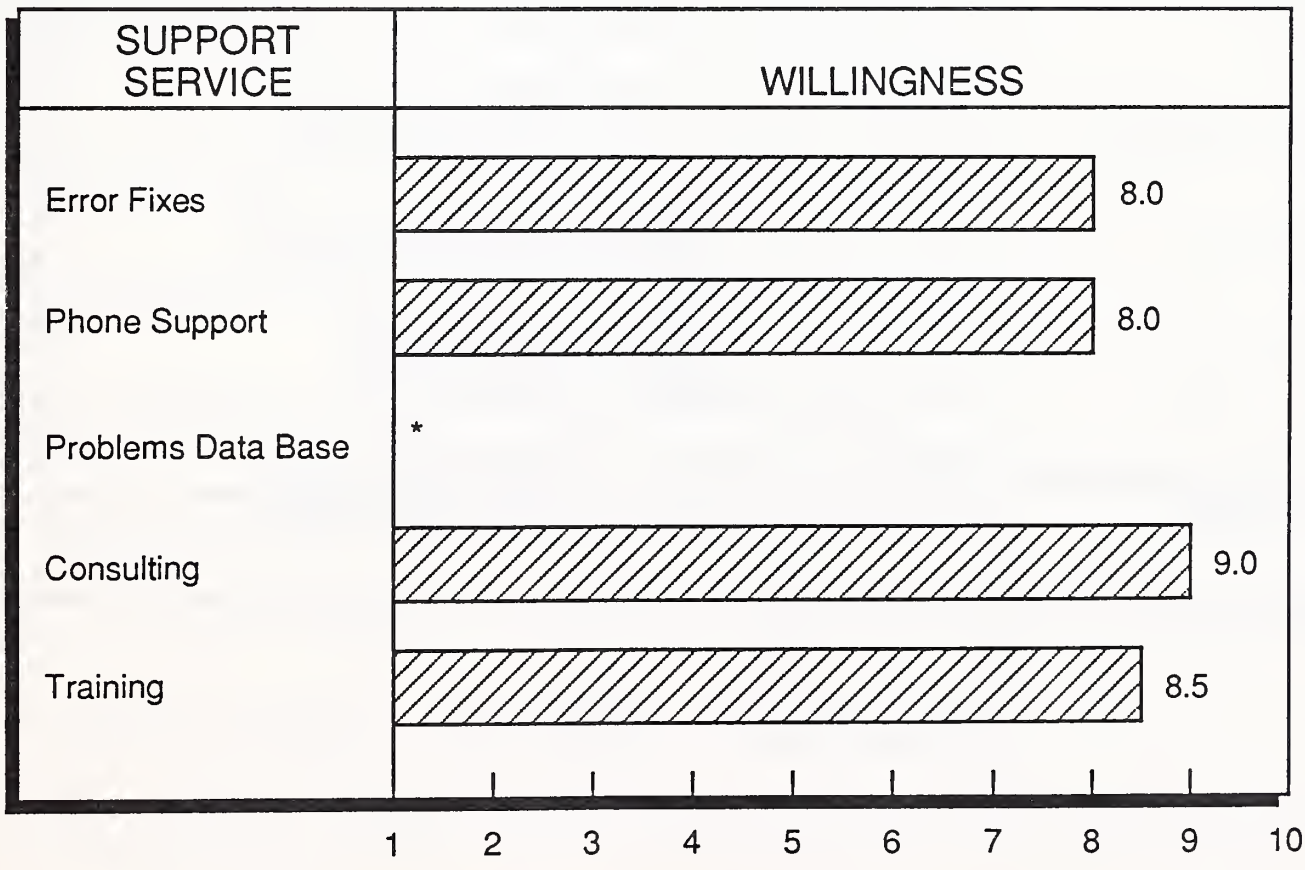
A = On-Site Support
B = Phone Support
C = Access to Problems Data Base
D = Documentation
E = Training
F = Consulting
G = Software Engineer Skill Level

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EXHIBIT IV-56

WILLINGNESS TO CONSIDER THIRD-PARTY SOFTWARE SUPPORT PANSOPHIC



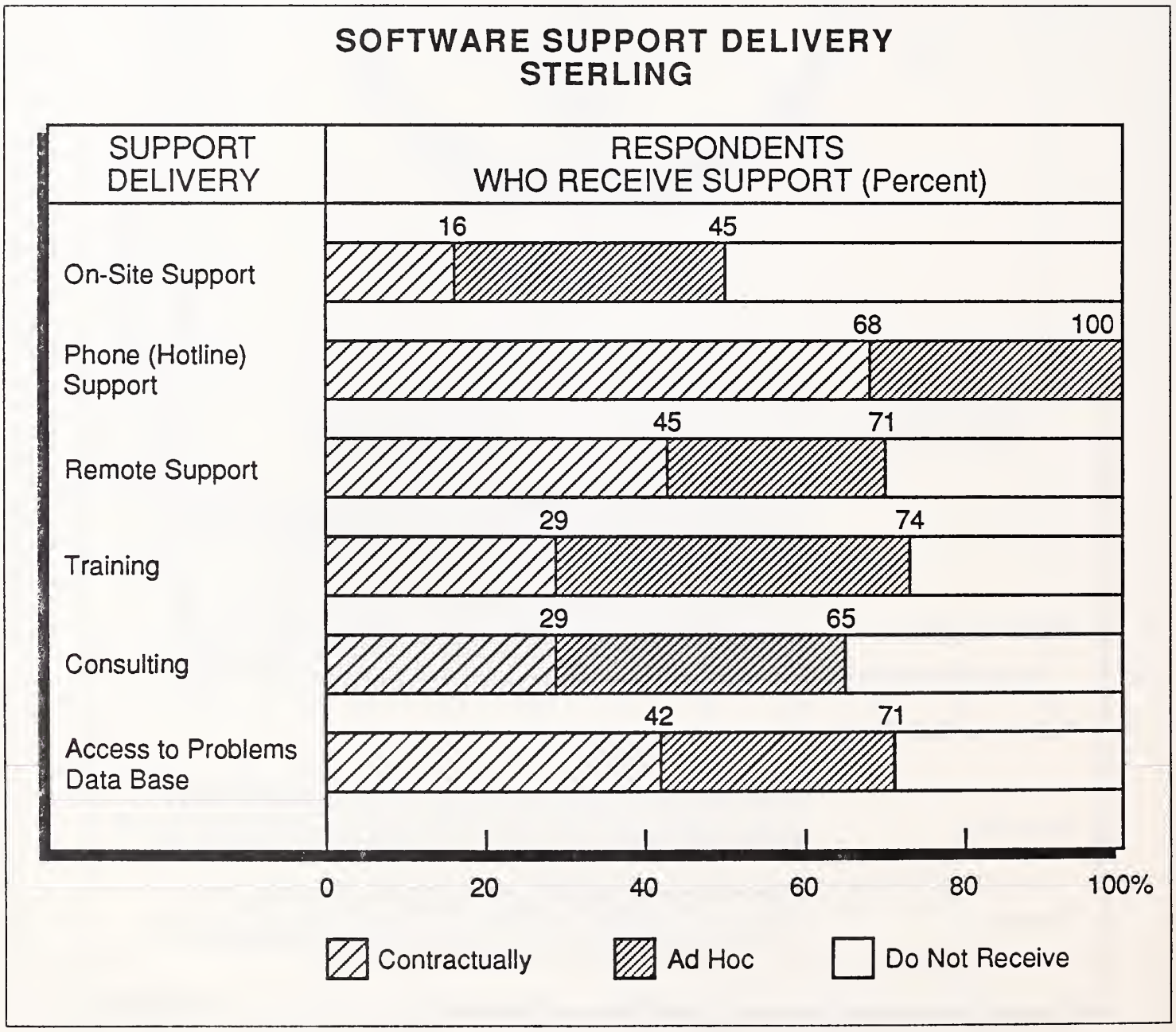


* Insufficient Response

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Exhibit IV-57 shows that the majority of Sterling users rely on telephone support as their principal source of contracted support; less than one-half of the sample reported any contact with on-site support; even fewer receive their support contractually in this manner. In fact, the Sterling sample had the largest percentage of users of all product samples that reported no support in a number of service areas, such as 29% who have not experienced remote support, 26% who have not experienced training, and 35% who have not experienced consulting support.

EXHIBIT IV-57



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The Sterling users reported relatively little experience with software problems, with only 0.4 major problems and 1.2 minor problems per month (shown in Exhibit IV-58). User satisfaction is quite high, as indicated in Exhibit IV-59. Users rated all areas of satisfaction between 8.7 and 9.1 (on a scale of 10).

EXHIBIT IV-58

SOFTWARE SUPPORT PERFORMANCE STERLING

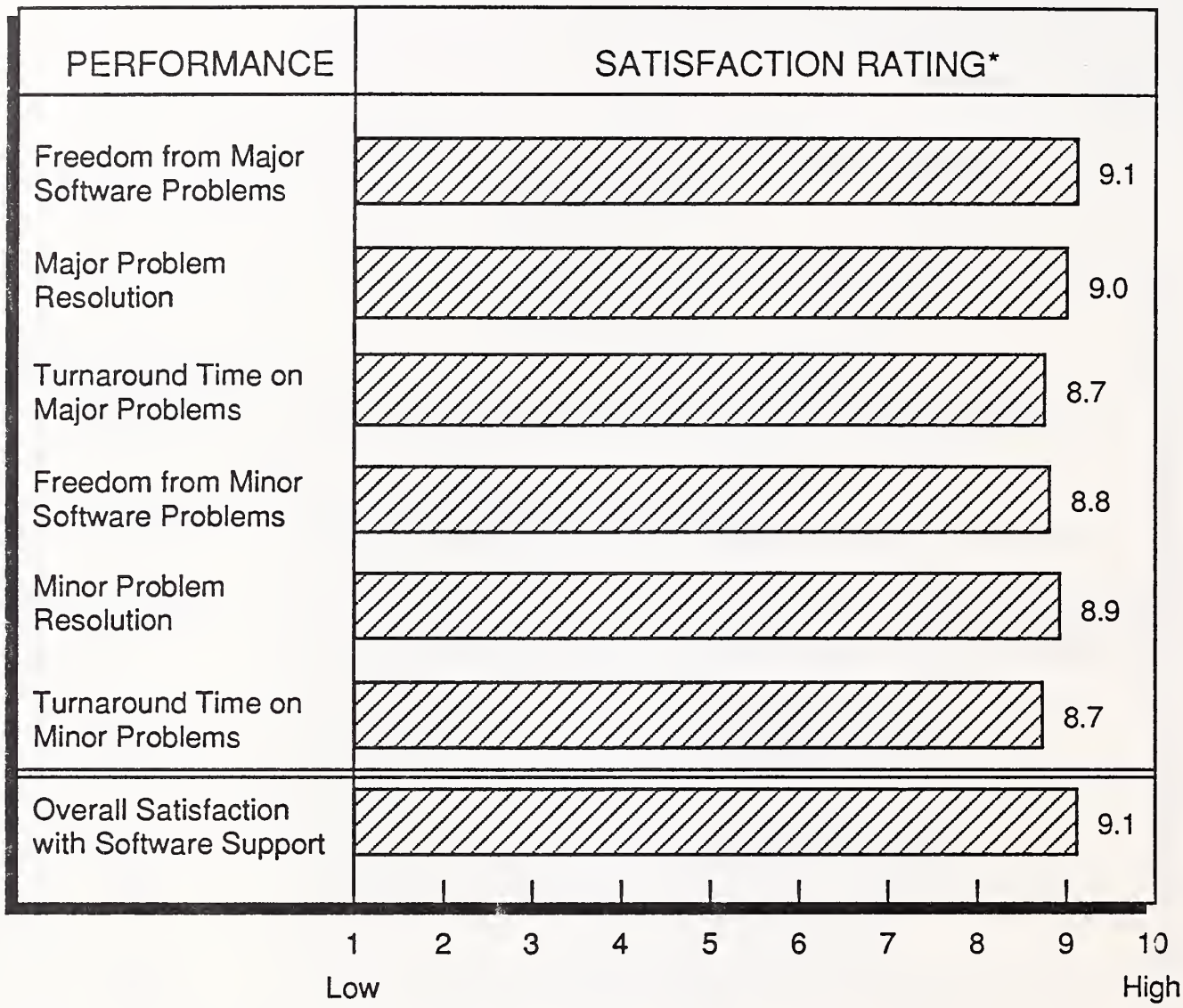
SUPPORT COMPONENT	
Number of Major Problems Reported per Month	0.4
Number of Major Problems Resolved per Month	0.4
Turnaround Time of Major Problems (Hours)	*
Number of Minor Problems Reported per Month	1.2
Number of Minor Problems Resolved per Month	1.2
Turnaround Time of Minor Problems (Hours)	10.0

*Insufficient Response

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EXHIBIT IV-59

USER SATISFACTION WITH SOFTWARE SUPPORT PERFORMANCE STERLING



*Average Standard Error of the Mean: 0.2

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Exhibit IV-60 (and later Exhibit IV-62, which shows the user reported value ratings versus vendor performance) indicates that Sterling users place the highest value on their software engineer's skill level (9.1 on scale of 10), documentation (8.9), and phone support (8.7). The user

EXHIBIT IV-60

SOFTWARE SUPPORT VALUE/PERFORMANCE LEVELS STERLING

SOFTWARE SUPPORT CATEGORY	LEVEL OF SUPPORT		PERFORMANCE EXCEEDS (FALLS BELOW) USER VALUE
	VALUE	PERFORMANCE	
On-Site Support	*	*	-
Phone Support	8.7	8.6	(0.1)
Access to Problems Data Base	7.8	6.9	(0.9)
Documentation	8.9	7.9	(1.0)
Training	7.5	6.2	(1.3)
Consulting	*	*	-
Software Engineer Skill Level	9.1	8.3	(0.8)

Scale: 1 = Low, 10 = High

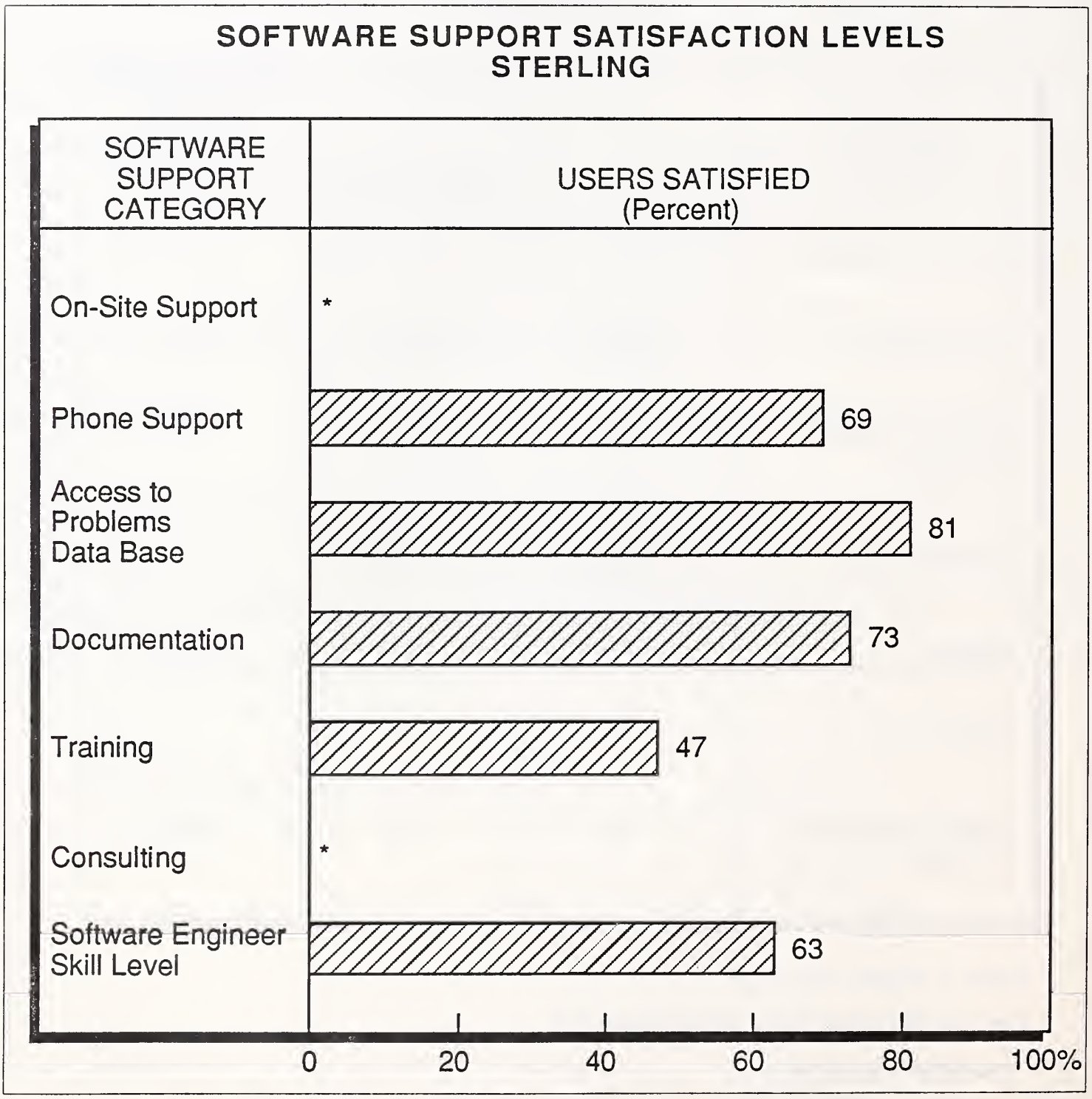
Average Standard Error of the Mean: 0.5

*Insufficient Response

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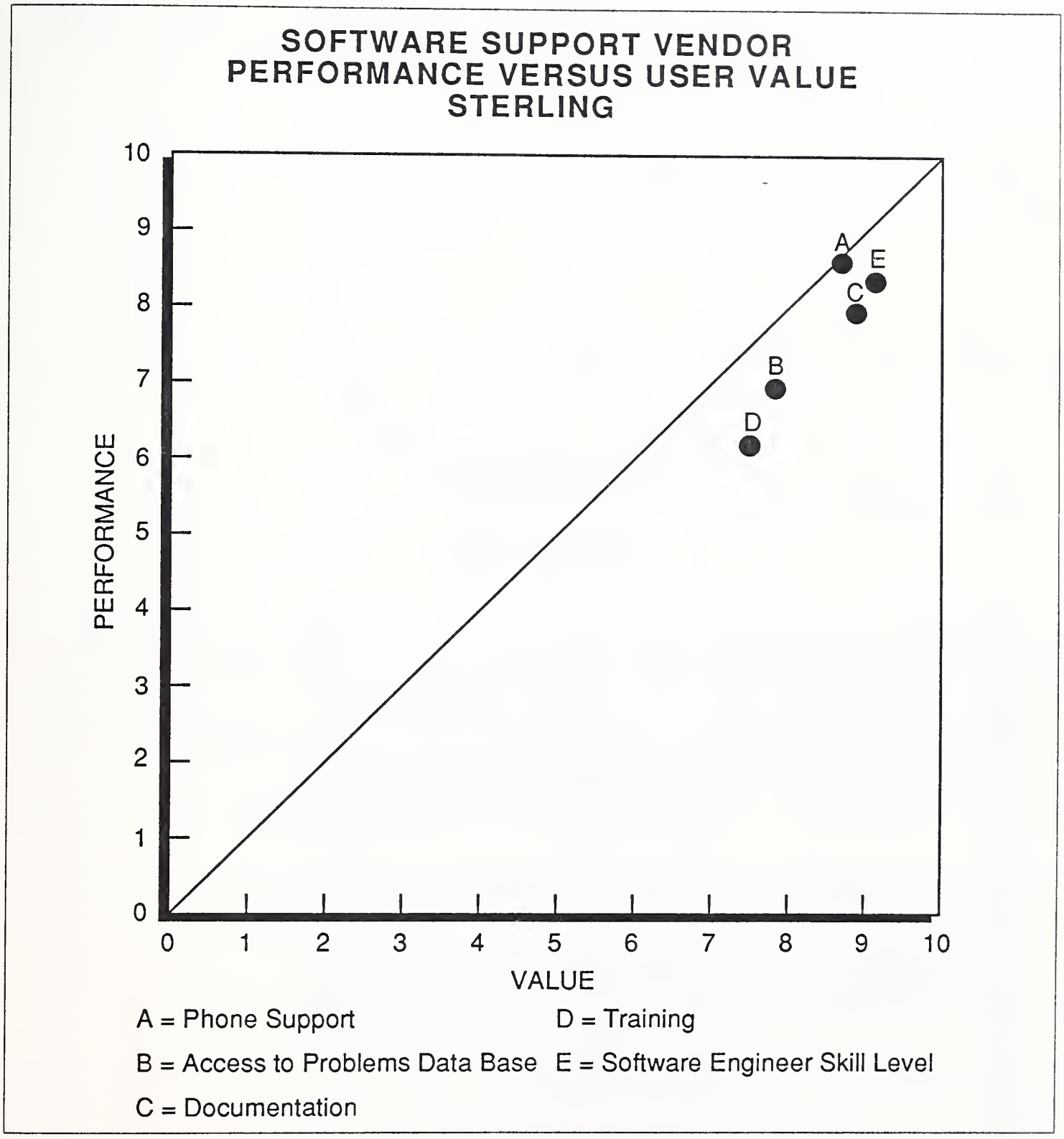
reported that vendor performance did not meet their needs, yet these ratings were influenced by a small group of dissatisfied respondents that biased the performance rating. This is supported by Exhibit IV-61, which shows that Sterling performance satisfied two-thirds or more of its users in each of these valued services. In fact, the only weak area appears to be training, where only 47% of the users were satisfied.

EXHIBIT IV-61



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EXHIBIT IV-62

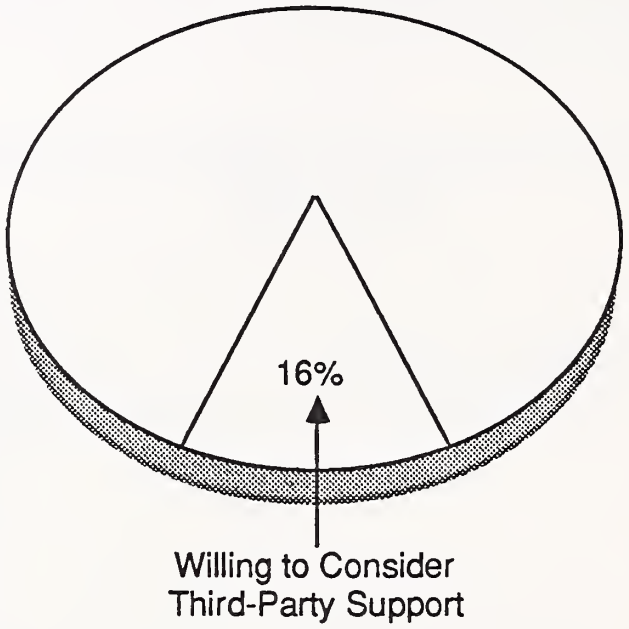


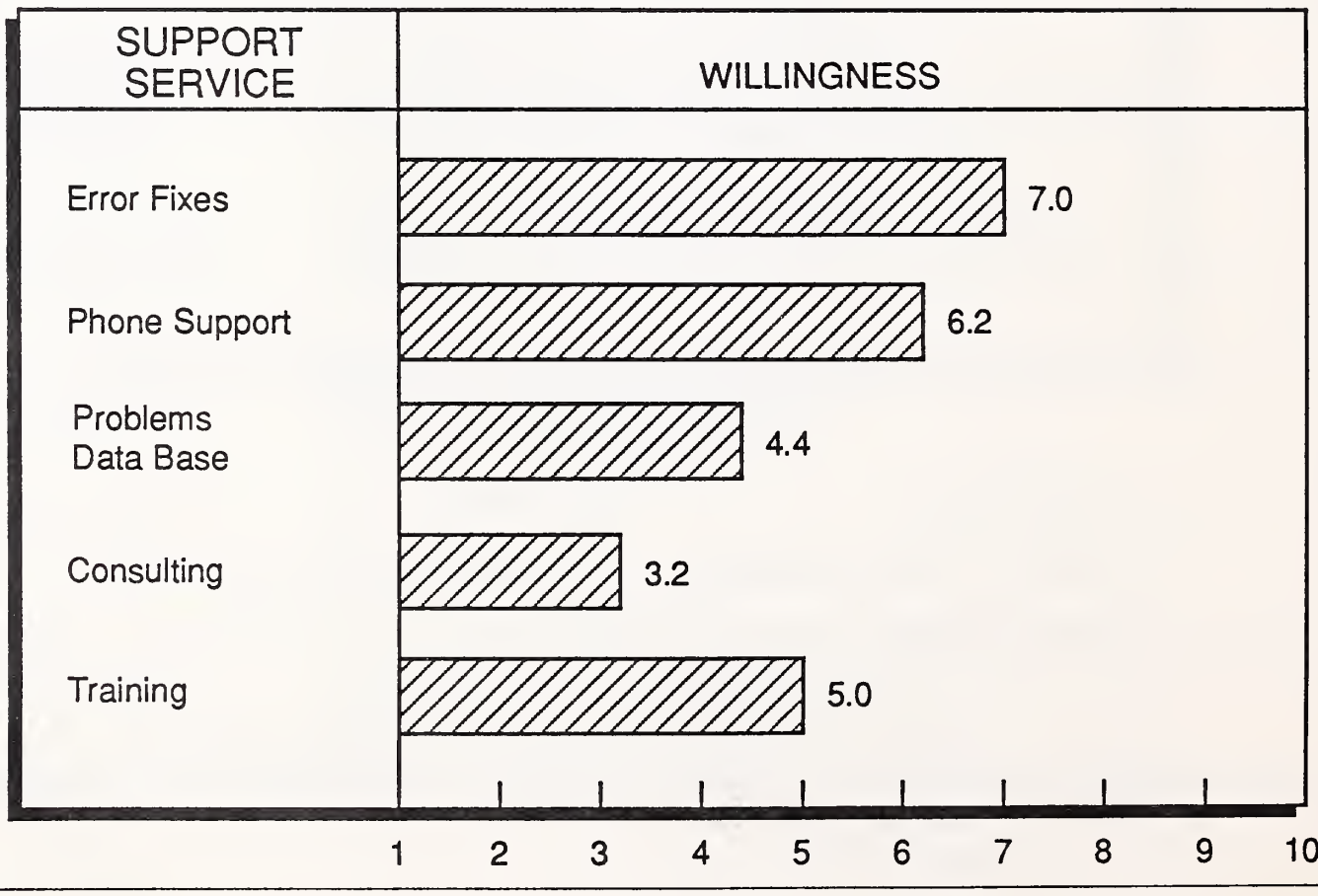
Overall, Sterling users are quite satisfied with the support that they receive. This satisfaction is reflected in their unwillingness to consider third-party software support as an alternative to Sterling, as shown in Exhibit IV-63.

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EXHIBIT IV-63

WILLINGNESS TO CONSIDER THIRD-PARTY SOFTWARE SUPPORT STERLING





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J

UCCEL

UCCEL Corporation designs, develops, sells, and supports both applications and systems software. In 1987, INPUT surveyed thirty users of UCCEL software, broken down by the following products: nineteen users of UCC-1 (a disk/tape/file management system), seven users of UCC-7 and UCC-8 (two communications control programs), and four users of UCC-11 (an automated rerun and tracking system). These users often used these programs in conjunction with other UCCEL systems management software, such as Space/Manager, Tape/Manager, and System/Manager.

UCCEL software is designed to run on IBM (and compatible) mainframes. The UCCEL sample ran on the following computer systems: seventeen IBM 30XXs, twelve IBM 43XXs, and one Amdahl 58XX.

The software analyzed is priced as follows: UCC-1, $26,000; UCC-7, $65,000; UCC-8, $28,500; and UCC-11, $21,000. The users reported that they paid between 12-15% for software support, averaging 14.4% per year.

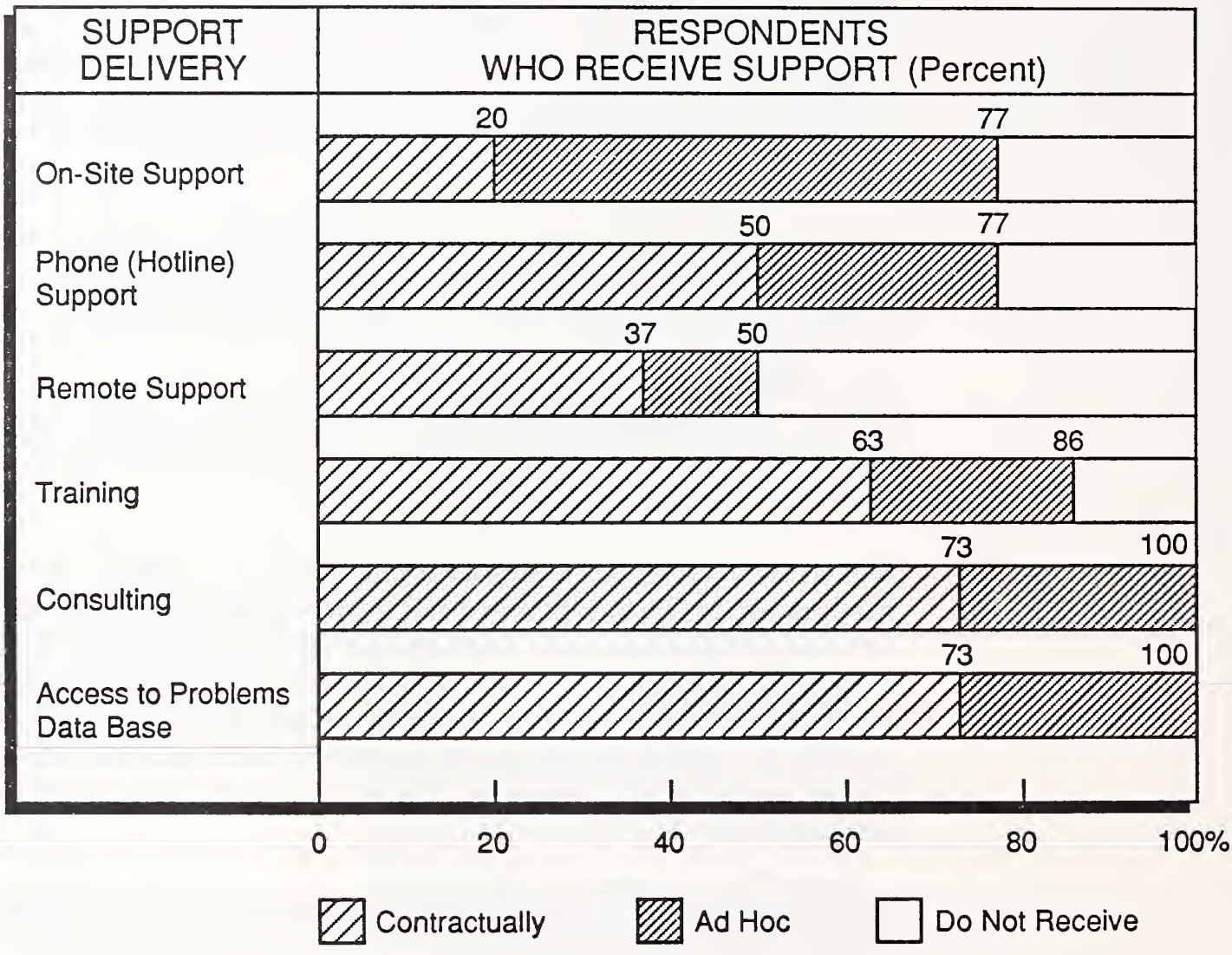
Exhibit IV-64 presents that software support picture for UCCEL users. Most support is delivered by telephone, supplemented by access to the InfoPlus problems data base. Three-quarters of the users have had some level of on-site support; however, few contract for it, and UCCEl reports that at least 75% of all calls can be handled by the telephone. UCCEL is working on a remote support system; systems software users can access a limited level of remote support that does not include down-line loading of software fixes.

UCCEL software exhibits a high degree of freedom from both major and minor software problems, as reported in Exhibit IV-65. UCCEL users reported so few major problems that it became impossible to analyze major problem turnaround time with any statistical accuracy. Turnaround time on minor problems averaged just over seventeen hours, well under the industry average of 26.5 hours.

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EXHIBIT IV-64

SOFTWARE SUPPORT DELIVERY
UCCEL



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EXHIBIT IV-65

SOFTWARE SUPPORT PERFORMANCE UCCEL

SUPPORT COMPONENT	
Number of Major Problems Reported per Month	0.2
Number of Major Problems Resolved per Month	0.2
Turnaround Time of Major Problems (Hours)	*
Number of Minor Problems Reported per Month	1.0
Number of Minor Problems Resolved per Month	1.0
Turnaround Time of Minor Problems (Hours)	17.1

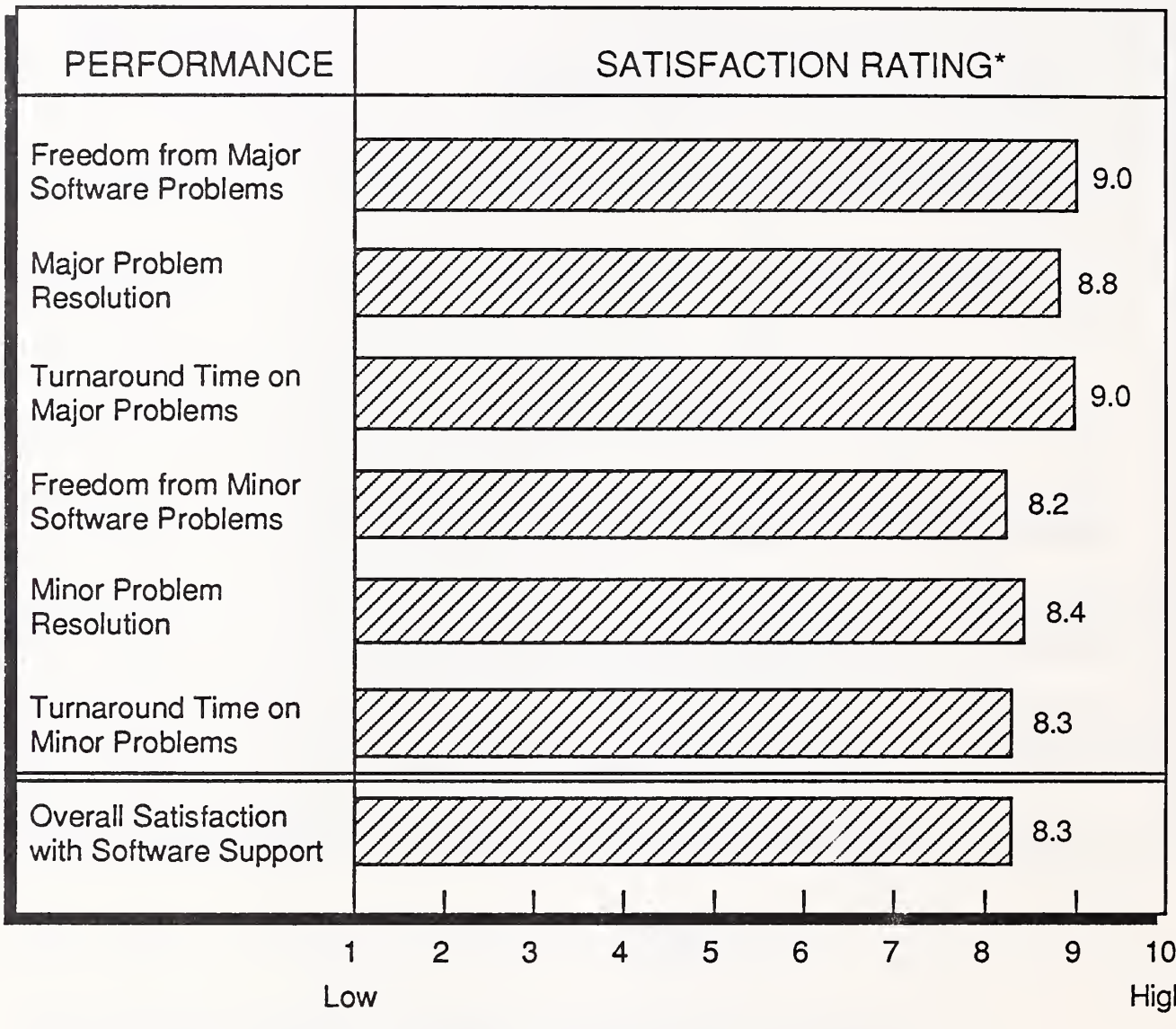
*Insufficient Response

Needless to say, UCCEL user satisfaction with each of these areas is relatively high, as shown in Exhibit IV-66. Satisfaction with major problem resolution and responsiveness is extremely high, ranging between 8.8 and 9.0 (on a scale of 10); however, satisfaction with UCCEL performance in regards to minor problems (8.2-8.4) tends to be more in line with the entire industry.

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EXHIBIT IV-66

USER SATISFACTION WITH SOFTWARE SUPPORT PERFORMANCE UCCEL



*Average Standard Error of the Mean: 0.3

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Exhibits IV-67 through IV-69 break down UCCEL satisfaction with software support in finer detail. Exhibit IV-67 indicates that UCCEL users place the greatest value on software documentation (rated a 9.1 on a scale of 10), followed by software engineer skill level (8.5) and consulting (8.4).

EXHIBIT IV-67

SOFTWARE SUPPORT VALUE/PERFORMANCE LEVELS UCCEL

SOFTWARE SUPPORT CATEGORY	LEVEL OF SUPPORT		PERFORMANCE EXCEEDS (FALLS BELOW) USER VALUE
	VALUE	PERFORMANCE	
On-Site Support	5.2	7.0	1.8
Phone Support	7.8	8.5	0.7
Access to Problems Data Base	7.6	7.5	(0.1)
Documentation	9.1	6.5	(2.6)
Training	7.3	6.7	(0.6)
Consulting	8.4	7.3	(1.1)
Software Engineer Skill Level	8.5	8.5	0

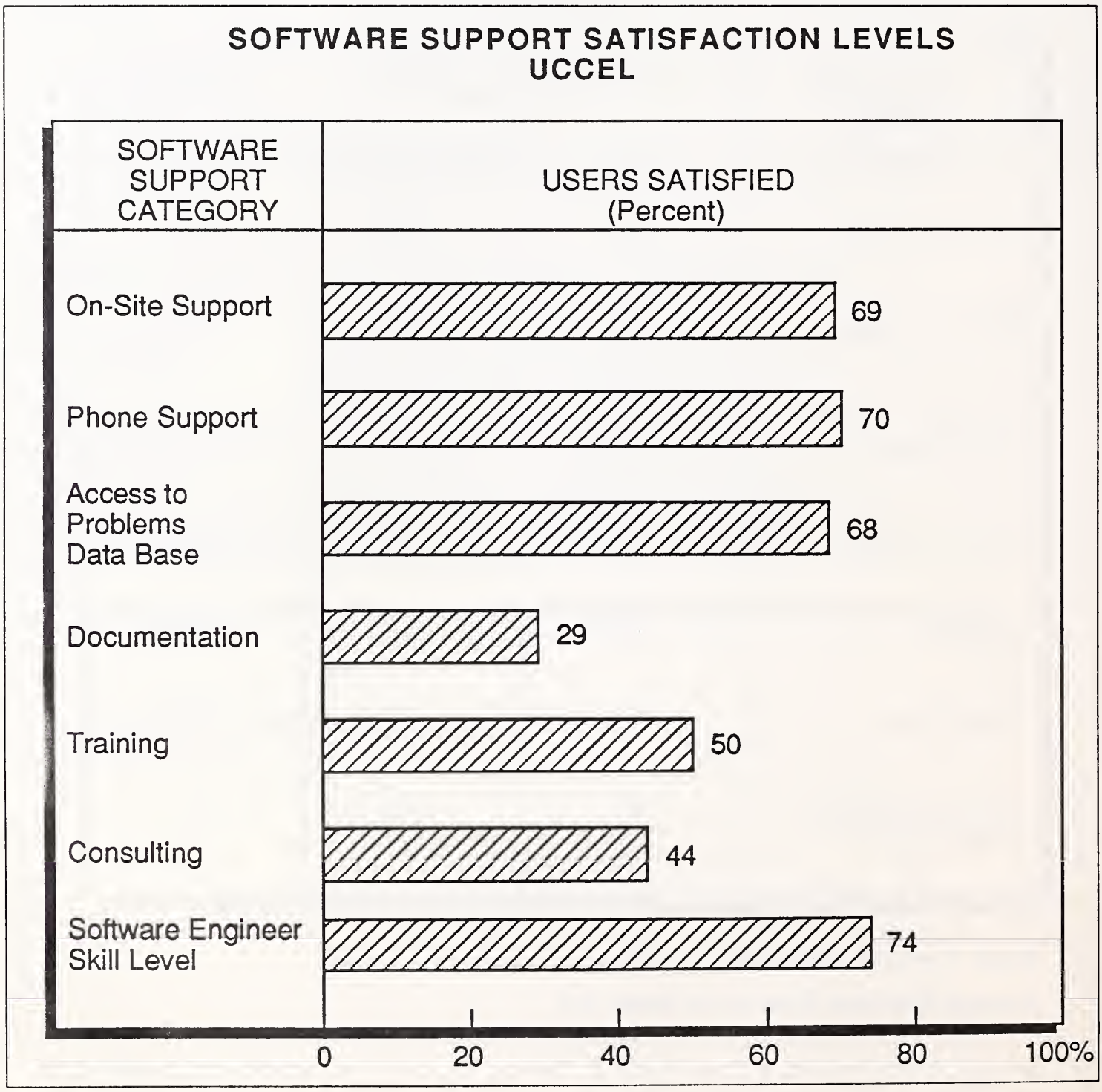
Scale: 1 = Low, 10 = High

Average Standard Error of the Mean: 0.5

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UCCEL users reported satisfaction with their software engineer skill level: 74% of the sample received at least the level of support in this as they required, as shown in Exhibit IV-68; however, UCCEL users are less satisfied with the consulting services and, most particularly, documentation that they received. Only 44% of the users were satisfied with consulting, which they often felt was too general in nature. Of greater concern was documentation, which satisfied only 29% of the users. Three users mentioned documentation as the most important improvement desired.

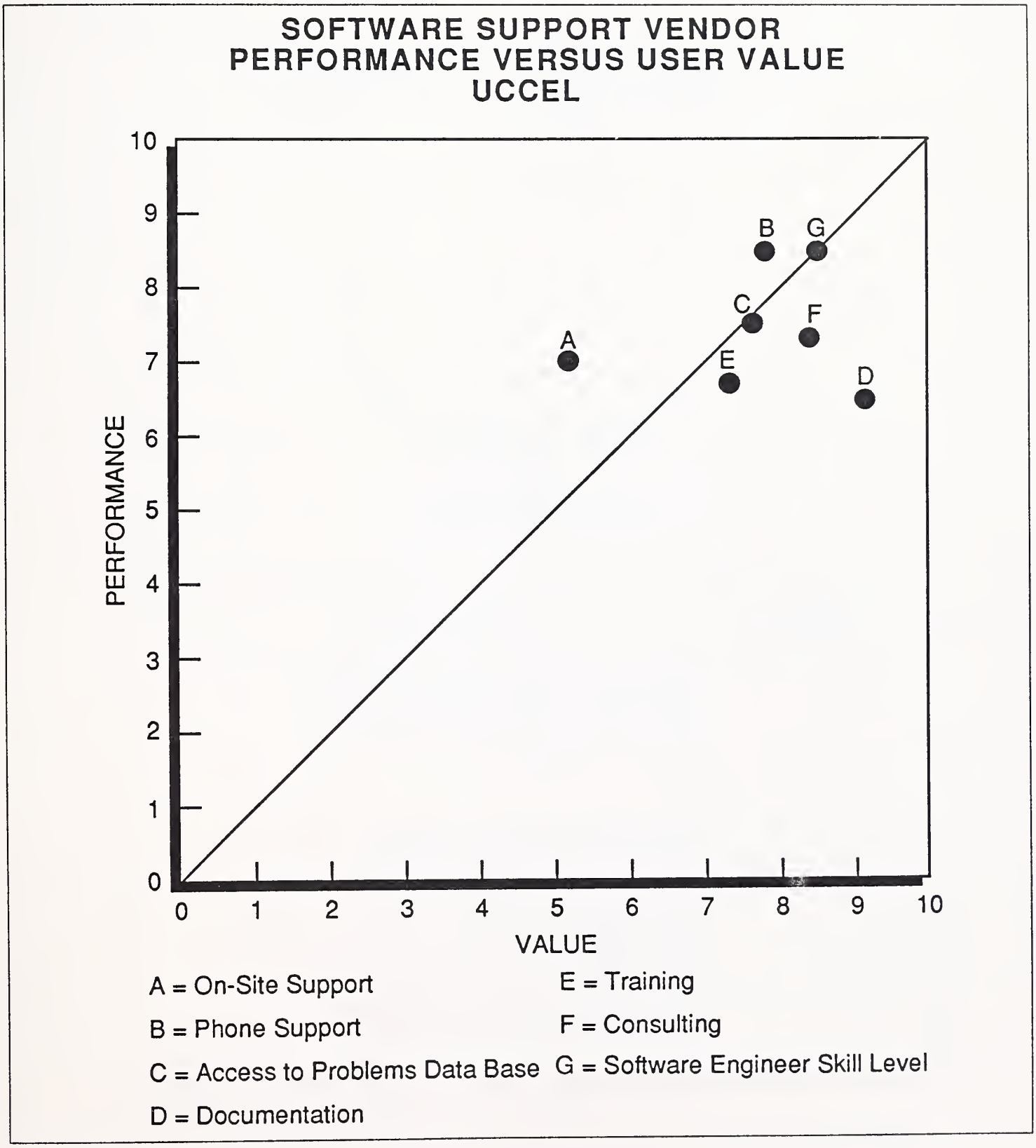
EXHIBIT IV-68



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Exhibit IV-69 graphically illustrates the discrepancy between users' requirements for documentation and consulting services and UCCEL performance and how this discrepancy has led to user dissatisfaction with these important service areas.

EXHIBIT IV-69

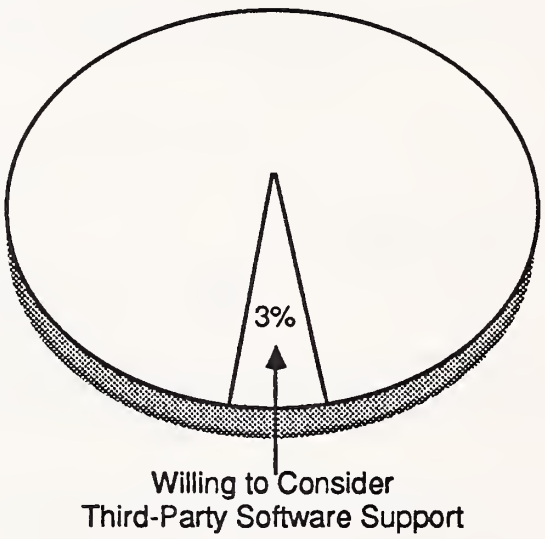


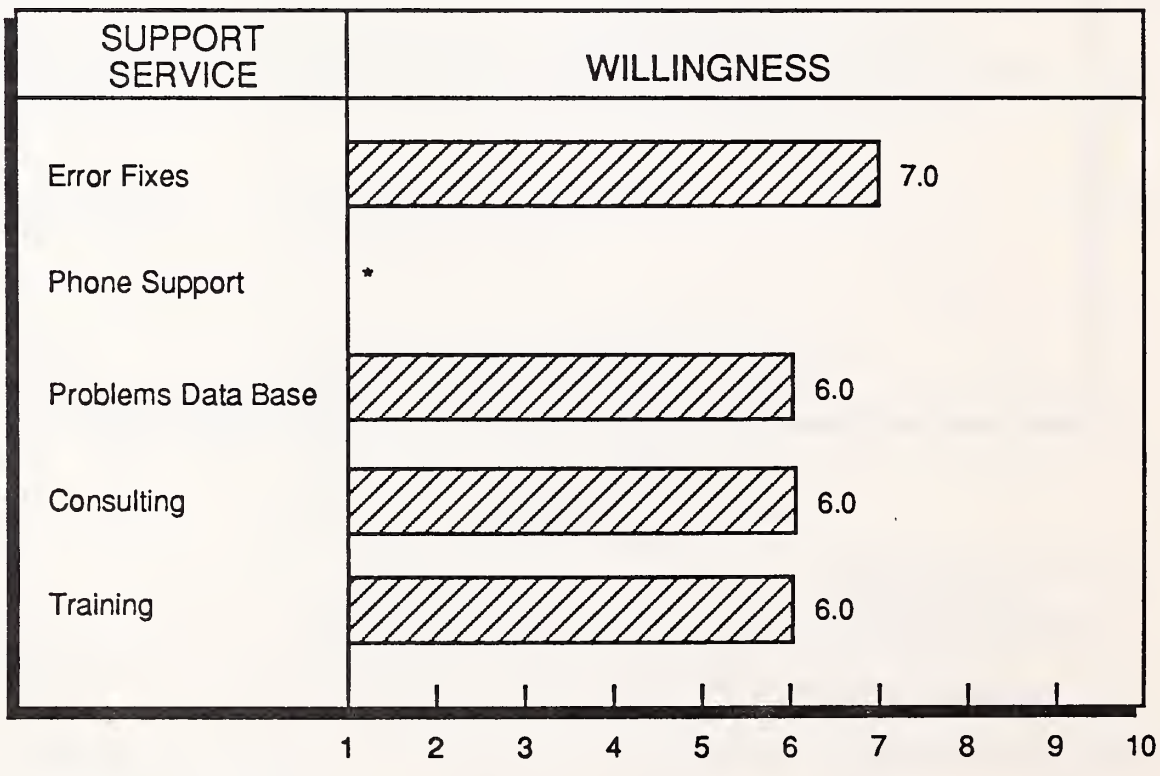
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Still, UCCEL users are very happy with the direct support in response to software problems that they receive from UCCEL. This satisfaction tends to limit their attraction to alternative support vendors. Exhibit IV-70 demonstrates that only one respondent (3% of the sample) was willing to consider a third-party software support vendor.

EXHIBIT IV-70

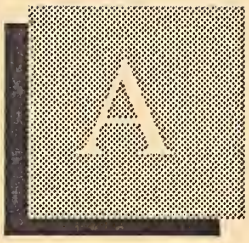
WILLINGNESS TO CONSIDER THIRD-PARTY SOFTWARE SUPPORT UCCEL





*Insufficient Response

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Appendix: Questionnaire



1987 Software Maintenance User Questionnaire

Background

QU:1 Software Vendor_____

QU:2 Software Product _____

QU:3 And you receive your software support from this vendor?

_____

(If no, thank them and discountinue the interview.)

QU:4 Software runs on (hardware manufacturer/model) _____

QU:5 What percent of software purchase/license cost are you paying for support?

_____%

Current Software Support

QU:6 Which of the following software support services do you receive on a contract basis and/or on an ad-hoc basis? (check all that apply)

		CONTRACT	AD-HOC
a.	On-site	_____	_____
b.	Telephone (hotline) support	_____	_____
c.	Remote support	_____	_____
d.	Training	_____	_____
e.	Consulting	_____	_____
f.	Access to problems data base	_____	_____

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Software Support Performance

QU:7 For the following questions, a "major software problem" can be defined as one in which processing cannot be continued, while a "minor software problem" allows processing to be performed with minor degradation. All questions refer to the last 12 months.

a. Average number of major problems reported (per month) _____

b. Number of major problems resolved (per month) _____

c. Turnaround time of major problem resolution (hours) _____

d. Average number of minor problems reported (per month) _____

e. Number of minor problems resolved (per month) _____

f. Turnaround time of minor problem resolution (hours) _____

QU:8 On a scale of 1 - 10 (10 being highest), how satisfied are you with:

		SATISFACTION
a.	Freedom from major software problems	_____
b.	Major problem resolution	_____
c.	Turnaround time on major problem resolution	_____
d.	Freedom from minor software problems	_____
e.	Minor problem resolution	_____
f.	Turnaround time on minor problem resolution	_____
g.	Overall satisfaction with software support	_____

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QU:9a Please rate your requirement, on a scale of 1 - 10 (10 being highest), for the following software support services.

QU:9b Please rate your level of satisfaction, on a scale of 1 - 10, for the service that you have received.

	REQUIRED	RECEIVED
1. On-site support	_____	_____
2. Telephone (hotline) support	_____	_____
3. Access to problems data base	_____	_____
4. Documentation	_____	_____
5. Training	_____	_____
6. Consulting	_____	_____
7. Software engineer skill level	_____	_____

QU:10 If you are not already receiving your software support by the following methods, what would you consider to be a reasonable premium to pay, as a percentage of your current charge, to receive support by these methods?

	PREMIUM
1. On-site support	_____
2. Telephone (hotline) support	_____
3. Remote support	_____

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QU: 11a Would you be willing to consider a third-party source of software support?

_____

QU: 11b (If yes) Please rate, on a scale of 1 - 10 (10 being high), your willingness to use the third-party support vendor for the following services:

		WILLINGNESS
1.	Error fixes	_____
2.	Telephone (hotline) support	_____
3.	Problems data base	_____
4.	Consulting	_____
5.	Training	_____

QU: 12 What single improvement would you like to see your current software support vendor make?

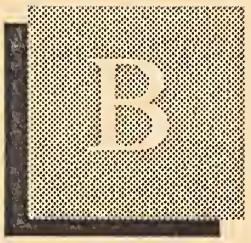
_____

_____

_____

Thank You!

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Appendix: Definitions

B

Appendix: Definitions

- Applications Software - Software that performs processing to service user's functions.
- Artificial Intelligence - The academic discipline involving the study of the processes by which humans perceive and assimilate data (and use reasoning to process this data) for the purpose of duplicating these processes within computer systems. Also, this term refers to the computer systems that accomplish these duplicated processes.
- BOC - Bell Operating Company.
- Consulting - Includes analysis of user requirements and the development of a specific action plan to meet user service and support needs.
- Dispatching - The process of allocating service resources to solve a support-related problem.
- Divestiture - The action, stemming from antitrust lawsuits by the Department of Justice, which led to the breakup of AT&T and its previously owned local operating companies.
- Documentation - All manuals, newsletters, and texts designed to serve as reference material for the ongoing operation or repair of hardware or software.
- End User - May buy a system from the hardware supplier(s) and do own programming, interfacing, and installation. Alternately, may buy a turnkey system from a systems house or hardware integrator.
- Expert Systems Applications - Applications for expert systems: a computer system based on a data base created by human authorities on a particular subject. The computer system supporting this data base contains software that permits inferences based on inquiries against the information contained in the data base. "Expert systems" is often used synonymously with "knowledge-based systems," although this latter term is considered broader and includes expert systems within its scope.

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- Engineering Change Notice (ECN) - Product changes to improve the product after it has been released to production.

- Engineering Change Order (ECO) - The followup to ECNs which include parts and a bill of material to effect the change in hardware.

- Escalation - The process of increasing the level of support when and if the field engineer cannot correct a hardware or software problem within a prescribed amount of time, usually two to four hours for hardware.

- Fiber Optics - A transmission medium which uses lightwaves.

- Field Engineer (FE) - For the purpose of this study, field engineer, customer engineer, serviceperson, and maintenance person were used interchangeably and refer to the individual who responds to a user's service call to repair a device or system.

- Field Service Management System (FSMS) - A specialized application program that automates some, if not all, of the following activities of a field service organization: call handling, dispatching, parts inventory and tracking, billing, efficiency reporting, and other functions. Ideally, the system accesses one data base from which each function can use and modify data.

- Hardware Integrator - Develops system interface electronics and controllers for the CPU, sensors, peripherals, and all other ancillary hardware components. May also develop control system software in addition to installing the entire system at the end-user site.

- ISDN - Integrated Services Digital Network. A proposed standard for digital networks providing transport of voice, data, and image using a standard interface and twisted pair wiring.

- LADT - Local Area Data Transport. Data communications provided by the BOCs within local access transport areas (LATA).

- Large System - Refers to traditional mainframes including at the low end IBM 4300-like machines and at the high end IBM 308X-like machines. Large systems have a maximum word length of 32 bits and a standard configuration price of $350,000 and higher.

- Major Software Problem - Problems ("bugs") that prevent further processing.

- Mean Time Between Failures (MTBF) - The elapsed time between hardware failures on a device or a system.

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- Mean Time to Repair - The elapsed time from the arrival of the field engineer on the user's site until the device is repaired and returned to the user for his utilization.

- Mean Time to Respond - The elapsed time between the user placement of a service call and the arrival at the user's location of a field engineer.

- Microcomputer - A microprocessor-based single- or multi-user computer system typically priced less than $15,000. A typical configuration includes an 8- or 16-bit CPU, monitor, keyboard, two floppy disk drives, and all required cards and cables.

- Minicomputer - See Small System.

- Minor Software Problem: A software problem ("bug") that allows further processing with some level of degradation.

- Operating System Software (System Software) - Software that enables the computer system to perform basic functions. Systems software, for the purposes of this report, does not include utilities or program development tools.

- PBX - Private Branch Exchange. A customer premises telephone switch.

- Peripherals - Includes all input, output, and storage devices, other than main memory, which are locally connected to the main processor and are not generally included in other categories, such as terminals.

- Planning - Includes the development of procedures, distribution, organization, and configuration of support services. For example, capacity planning, "installation" planning.

- Plug-Compatible Mainframe (PCM) - Mainframe computers that are compatible with and can execute programs on an equivalent IBM mainframe. The two major PCM vendors at this time are Amdahl and National Advanced Systems.

- Professional Services - A category of services including system design, custom programming, consulting, education, and facilities management.

- RBOC - Regional Bell Operation Company. One of seven holding companies coordinating the activities of the BOCs.

- Remote Diagnostics - Gaining access to a computer from a point physically distant from the computer in order to perform problem determination activities.

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- Remote Support Implementation - An extension of remote diagnostics where some level of support delivery is performed from a point physically distant from the computer. Currently, this capability is more common to software support where problems can be solved or circumvented through downline loading of new code (fixes).

- Reseller - A marketing organization which buys long-distance capacity for others at wholesale rates, selling services at retail but discounted prices and profiting on the difference.

- Small Business Computer - For the purpose of this study, a system which is built around a Central Processing Unit (CPU), has the ability to utilize at least 20M bytes of disk capacity, provides multiple CRT workstations, and offers business-oriented systems software support.

- Small System - Refers to traditional minicomputer and superminicomputer systems ranging from a small multi-user, 16-bit system at the low end to sophisticated 32-bit machine at the high end.

- Software-Defined Network - A private network which uses public network facilities and which is configurable on an as-needed basis by the user (see Virtual Private Network).

- Software Engineer (SE) - The individual who responds (either on-site or via remote support) to a user's service call to repair or patch operating systems and/or applications software.

- Software Products - Systems and applications packages which are sold to computer users by equipment manufacturers, independent vendors, and others. Also included are fees for work performed by the vendor to implement a package at the user's site.

- Superminicomputer - See Small System.

- Systems Integration - The action of a single service vendor's design, development, and implementation of a system or subsystem including integration of hardware, software, and communications facilities for a customer.

- System Interruption - Any system downtime requiring an Initial Program Load (IPL).

- Systems House - Integrates hardware and software into a total turnkey system to satisfy the data processing requirements of the end user. May also develop systems software products for license to end users.

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- T-I - Refers to a standard 1.544 megabit per second digital channel used between telephone company central offices and now used for microwave, satellite, fiber optics, or other bypass applications.

- Third-Party Maintenance (TPM) - Any service provider other than the original equipment vendor.

- Training - All audio, visual, and computer-based documentation, materials, and live instruction designed to educate users and support personnel in the ongoing operation or repair of hardware and software.

- Turnkey System - Composed of hardware and software integrated into a total system designed to completely fulfill the processing requirements of a single application.

- VSAT - Very Small Aperture Terminal. A small satellite dish system, usually using Ku-band frequencies.

- Virtual Private Network - A portion of public network dedicated to a single user.

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